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RESTORATIVE URBAN SPACES IN EUROPE: COMPARISONS OF CRITERIA AND APPROACHES IN GERMANY AND ITALY

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ABSTRACT

To preserve or protect areas where people can take refuge from urban noise, the Directive 2002/49/EC introduced the term “quiet area within urban agglomerations”, delegating the definition of the criteria to identify these areas to EU member states. These criteria mainly focus on identifying large green areas with sound pressure levels lower than certain thresholds. Following the attention restoration and stress recovery theories, several scholars also investigated the role of natural elements in the psychophysical restoration of individuals, suggesting the importance of promoting restorativeness through features beyond sound, which remains a predominant factor. To this aim, researchers are actively exploring the possibility of identifying additional urban spaces that can fulfill this role, offering high auditory restoration quality.

This paper briefly outlines the European context, focusing on the criteria and approaches used in Italy and Germany to select and classify restorative urban areas in agglomerations. The main findings reveal that both countries lack generally applicable criteria. National and local rules indicate that, in Germany, there is an openness to considering small quiet urban pockets characterized by greenery and recreational activities, while in Italy, there is attention to considering, beyond the naturalistic and landscape aspect, also the historical artistic value of sites.

Keywords: *Restorativeness, quiet areas, criteria, Italy, Germany.*

1. INTRODUCTION

Urban planning and design decisions affect people’s lives in different ways, playing a key role in supporting and promoting the well-being of citizens [1]. More in particular, inside cities some spaces, like the restorative urban spaces may trigger the psychological and/or physiological recovery processes of the mental resources “consumed” by individuals in stressful urban settings.

While, the initial attention of researchers and authorities was focused on large green areas with sound pressure levels below certain thresholds [2], only later, based on theories of restorative Kaplan’s Attention Restoration Theory (ART) [3] and Ulrich’s Stress Recovery [4], several researchers have started to investigate on further aspects (e.g. physical, psychological and social) of urban environments that might support active and passive (auditory) restoration processes. Findings demonstrated clearly that green spaces with flowers, trees [5,6] and water elements [7,8] can provide mental and physical relief. However, other environmental factors may also influence perceived restorativeness, such as the artistic, historical and cultural elements [9-11]. Other important elements to consider are the activities carried out, their intensity, maintenance and management, and perceived safety [12]. For all of the above environmental features,

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researchers are actively exploring the possibility of identifying additional urban spaces that could serve as quiet areas.

Potential restorative urban places should be characterized by the quietness and beautifulness of spaces, the separation by the urban context and the presence of natural (green and blue), architectonic and artistic elements. These characteristics can be found in urban green spaces (gardens or urban parks), squares (large and historic pedestrian squares), private residences (private courtyards) and buildings for spiritual meditation (cloisters of church and monastery) which exist in any European city.

Although the concept of restorative urban spaces requires a complex and multifaceted analysis of the characteristics that could make an urban space eligible for this important role, till today, this role has been exclusively based on the quietness of the place, revealed by their acoustics designated in combination with land use types.

2. QUIET AREAS IN EUROPE

The concept of quiet areas was introduced by the Environmental Noise Directive (END) 2002/49/EC) [13] with the general aim of preserving existing quiet areas in agglomerations and rural areas. It is the first attempt to introduce the concept of restorative areas, that in the END are set equal with the meaning of silent areas.

Although the introduction of the concept of quiet areas in the END represents an important step ahead toward the definition of restorative areas, its application is still complicated. A key aspect of the END was to delegate the definition of the selection criteria of the quiet areas to each Member State. To support this definition, in 2014, "The Good Practice Guide on Quiet Areas" [14] suggested some selection criteria for quiet areas within urban agglomerations. They include acoustic indicators (L_{eq} , L_{den} , L_{95} , L_{day}), the designed function and land use type of the area (recreation, nature protection, health protection/ restoration), the quality of the soundscape, the visual aspects (values of the areas) and the size of the area, which was set between 100 and 100 000 m^2 for urban quiet areas.

While in 2016, the report "Quiet Areas in Europe: The Environment Unaffected by Noise Pollution" [15] introduced a method called Quietness Suitability Index (QSI) that identifies areas that are potentially quiet in rural contexts based on the combination of the existing noise mapping data combined with land use data, the identification of quiet places in urban areas is much more complex.

To all previous reasons the definitions of the criteria to identify the restorative places have been developed

differently over European countries. In the next paragraphs the experiences and criteria indicated in Italy and Germany are presented.

3. CRITERIA AND APPROACHES IN ITALY

With the recent emanation of Decree n.16 of the MiTE [19], in Italy, an important step ahead has been realized to foster a common approach to identify the quiet zones of an agglomeration and in an open country. Focusing on the first one, the Annex A of the Decree describes them as public areas, or in any case accessible to the public, dedicated to recreation, refreshment and the conservation of natural sound environments (i.e. geophony and biophony), which are not affected or are affected to an insignificant extent by technological sounds and to a limited extent by anthropogenic sounds and which are mainly characterized by wanted sounds that are typical for that areas and consequently consistent with the expectation of users. Such zones are considered areas of good acoustic quality.

In compliance with the Legislative Decree 19 August 2005, n. 194 [20], for quiet areas in agglomerations, this Decree identifies the limit value of 55 dB(A) L_{den} for the noise produced by transport infrastructures and industrial activity sites. It is important to know that this Annex explicitly underlines that quiet areas in an agglomeration must satisfy both acoustic and non-acoustic criteria and that the latter should include a minimum territorial surface and a high valence of the use of the area (naturalistic, landscape, archaeological, architectural, historical-artistic and cultural interest), as indicated in the urban plans.

Among the delimiting criteria that the Annex introduced, some of them are mandatory while others are optional.

The first can be identified from the strategic noise maps and the territory's acoustic classification, which can be further selected based on the territorial extension ($A \geq 3000 m^2$) and their use. It is important to note that the territorial extension can be neglected if networks of silent zones are considered. Examples of these areas include areas of prevalent naturalistic interest (urban green/blue infrastructures), landscape, archaeological, architectural and historical-artistic interest, such as urban parks, natural areas, urban stretches of river banks and lakes, archaeological sites, areas of historical-cultural value (thermal areas, vegetable gardens and botanical gardens, monumental cemeteries), areas characterized by panoramas and visual elements of landscape value. Apart from the identification of "quiet areas of an agglomeration subject to greater protection" ($A \geq 10000 m^2$, $L_{den} \leq 50$ dBA), further optional criteria, which application is left to the discretion of the competent





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authorities, includes the facilitation of pedestrian accessibility in the quiet area of an agglomeration; the analysis of the perception aspects, in particular regarding the description of the soundscape; the definition of a network of quiet areas of an agglomeration, or more areas with territorial dimensions less than 3000 m², whose acoustic quality is intended to be protected. This network can be made up of areas of various types (squares, parks, courtyards of historic buildings, river axes, lake shores), integrated into the urban fabric and in coherence with the existing green/blue infrastructures, connected to each other by elements of spatial contiguity, such as paths and pedestrian spaces or cycle paths. These areas are characterized by possessing acoustic and non-acoustic criteria, except the extension criterion.

The analysis of the Action Plans (IV cycle) prepared by several Italian agglomerations (i.e. Roma, Napoli, Firenze, Venezia, Brescia, Trieste, Parma) has evidenced that only four criteria were used in all the agglomerations analyzed, that are: L_{DEN} of the strategic noise maps sources ≤ 55 dB(A); territory's acoustic classification I, II or III; territorial extension ≥ 3000 m² and the use indicated in the urban plan coherent with the public use. In almost all cases, the selected areas are urban gardens, parks or woods. Apart from some cemeteries, interestingly there are the inclusion of a belt area around the lakes "delle Rose", "del Canneto" and "del Gerolotto" in the agglomeration of Brescia, and the inclusion of an archeological area, the "Parco Archeologico Ambientale del Paesaggio", of the agglomeration of Naples, that are the most evident witness of the attention toward blue and cultural areas (Figure 1).



Figure 1. Quiet areas identified by the Noise Action Plans in Italy. Top: Map of the Quiet Areas of (left). Belt area around the lakes of Brescia (right). Bottom: Parco Archeologico Ambientale del Paesaggio of Naples.

Still limited is the inclusion of networks of quiet areas, which are still made up of only green areas.

4. CRITERIA AND APPROACHES IN GERMANY

The designation and protection of quiet areas defined in the Environmental Noise Directive were adopted into national law via §§ 47a et seq. of the Federal Immission Control Act - BImSchG. There it is defined that the aim of these plans is also to protect quiet areas against an increase in noise. However, there is great freedom in selecting and designating quiet areas and there is no one right way or a uniform planning procedure [18]. In particular, the choice of criteria for identifying areas to be eligible as 'quiet areas' is up to the local authorities. Thus, several criteria and requirements are in practice to designate quiet, restorative areas such as L_{DEN} (e.g. < 55 dB(A)), certain levels related to sub-areas, Δ level criteria (6 to 10 dB), land use, size, or even accessibility or the subjective assessments of residents, as only user and visitor experiences can provide insight into how people perceive a quiet area.[14]

The type of land use is the most frequently used selection criterion for quiet areas; around 90 % of German cities have used this criterion. [19] Thus, in the context of quiet areas - besides acoustic criteria like L_{DEN} or level differences - non-acoustic factors are frequently considered as well. However, cities use different criteria, such as Hamburg demands for quiet areas that those sites are accessible, offer a low noise exposure ($L_{DEN} < 50$ dB(A) for road, rail and air traffic) and a minimum size of 50 ha. In Cologne, areas were designated as quiet areas when there is noise exposure of less than 55 dB(A) L_{DEN} in combination with the land use types green, agricultural and wooded.

The Berlin noise action plan identifies quiet areas or areas that should be protected from noise to provide a better quality of life and restoration possibilities for the local population [20]. The Berlin noise action plan specifies three types of areas to be protected from noise: *quiet areas* (Ruhiges Gebiet), *inner-city green and recreational areas* (Innerstädtische Grün- und Erholungsfläche) and *urban rest and recreational spaces* (Städtische Ruhe- und Erholungsräume) [21]. A quiet area is defined as a natural area and open space such as forests, green spaces, parks, fields, meadows and pastures, partly also in connection with metropolitan area-wide connections to neighboring landscape areas that have low sound pressure levels. The noise criterion is that the overall noise (L_{DEN}) should not exceed 55 dB(A), and the area size should be larger than 100 ha. However, recently the indicator of less than 55 dB(A) is changed from L_{DEN} to L_{DE} .





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only. These areas have the potential to offer restoration considering typical times for visits, thus excluding night. [22] Smaller areas are inner-city green and recreational areas that do not necessarily have low sound pressure levels but are believed to act as important public spaces within walking distance to residential locations and are at least significantly quieter in their inner parts compared to the periphery. Here, selection criteria like level difference of at least 6 dB(A) (center to the edge) are applied apart from the requirement that the areas need a minimum size of 30 ha. Criteria for the third category *urban rest and recreational spaces* are not defined yet but are currently being discussed [22]. It is assumed that no acoustic knockout criterion needs to be specified when selecting those small areas. According to the Berlin Senate these spaces have the potential to offer Berlin residents' peace and quiet in their everyday lives. [22] Due to the accelerated growth of the city, this additional category might gain significance in areas which are under-supplied in terms of larger quieter, restorative areas. With that Berlin is going one step further with inner-city green and recreational areas as well as smaller recreational spaces, although the END [13] only requires strictly the designation of quiet areas.

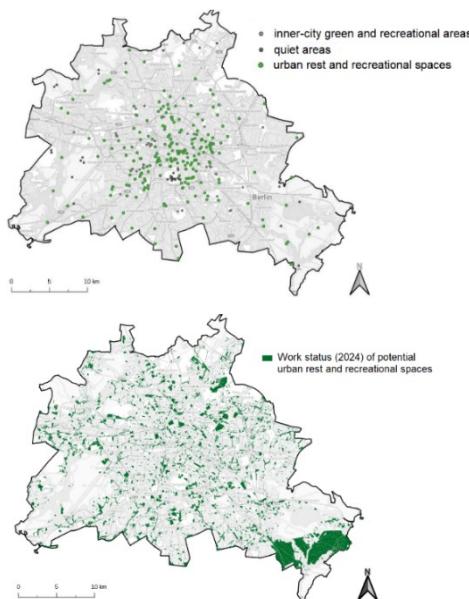


Figure 2. Urban rest and recreational spaces. Top: Map of Berlin with recreational spaces based on public participation. Bottom: Map of Berlin (works status) with potential small areas acting as urban rest and recreational spaces (adapted from [22]).

Figure 2 illustrates the results of public participation and the first development of a map with proposed urban rest and recreational spaces. It was observed that 70 percent of the areas proposed by residents correspond with the spaces from the first draft of potential urban rest and recreational spaces. Consequently, research was carried out to determine the restoration quality of areas, which do not fulfill the typically applied requirements regarding size, land use type or even level indicator. Current investigations have repeatedly shown that small areas (smaller than 30 ha), as proposed as an additional category in Berlin without strict size or level requirements, can provide significant restoration quality and thus can act as recreational spaces. [23, 24] It was also observed in field studies that the judged auditory restoration level correlates moderately with the general perceived restoration quality ($r=0.48$), but further aspects besides quietness are needed to make an urban space to a recreational area [24].

5. CONCLUSIONS

As shown above, in Italy and Germany, the current selection criteria for quiet areas are less stringent with respect to minimum size or level indicators and more and more the aspect of perceived restoration quality is considered. Consequently, while it could appear reasonable to use existing restoration metrics, like TRAPT [25] or PRSS [26], to "measure" the restorative character of areas, it is also evident from the literature that the soundscape is only partially responsible for the perceived overall restoration potential of a site. Aspects such as proximity and accessibility, opportunity to relax and opportunities for various activities as well as the maintenance of the space were mentioned in surveys as relevant for restorative places besides own noise exposure [12, 22]. This means that if the real scope of these urban spaces is psychophysical restoration, it is necessary to pass from the concept of quiet areas to restorative areas. In this context, it needs to be discussed whether built-up residential areas should also be considered as quiet areas as far as they offer sufficient restoration quality.

In Germany, this is still a controversial issue, and most of the noise action plans still focus on unbuilt areas as quiet areas due to restrictions to green land use types. [19] Here, Italy has started to add further urban categories to the list of potential quiet and restorative areas besides the usual land use types green or urban forest. Regarding this, it is even more important to identify the weight of soundscape contribution in the restorative role of these areas.





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