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## A soundscape study in New York. Reflections on the application of standardized methods to study everyday quiet areas.

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### ABSTRACT

In 2014 and, more recently, in 2018 the ISO norms on soundscape were released with the aim of providing a conceptual framework and standardized data collection and analysis methods for the international community of scientists and professionals involved in the study of soundscape. This paper presents a soundscape study conducted in New York where, following the ISO norms on soundscape, methods are applied to study everyday quiet areas. Firstly, the paper introduces the research questions of the soundscape study. Secondly, it outlines the procedure and methods of the study, consisting of desk research, interviews with stakeholders and on-field data collection through soundwalks and the use of the Hush City app. Thirdly, it discusses preliminary results, focusing on the outputs of desk research, interviews and the soundwalk conducted for the 2019 International Noise Awareness Day. In conclusion it reflects on the application of standardized methods to study everyday quiet areas in densely populated, large cities, such as New York and outlines future research directions.

Keywords: soundscape, soundwalks, quiet areas, public spaces, Hush City app, New York

### 1. INTRODUCTION

The “soundscape approach” aims at studying the acoustic environment as it is perceived, experienced and understood by people in context (1) and how it can be usefully applied to planning better urban quality of life (2) especially in big, populated cities, where excessive exposure to noise has been proved to account for negative physical and mental health effects (3).

In 2014 and, more recently, in 2018 the ISO norms on soundscape were released with the aim of providing a conceptual framework and standardized data collection and analysis methods for the international community of scientists and professionals involved in the study of soundscape (2).

This paper presents a research study conducted in New York where the soundscape approach was applied by the author to study existing and potential everyday quiet areas (4). New York City was chosen for the research stay due to historical contingencies. In 2016, by acknowledging the subject of noise in three plus decades, the US National Science Foundation awarded \$4.6 million to the “Sounds of New York City” (SONYC) project proposed by a team of the New York University scholars to research noise in New York City (5). The United States has a rather long history on the issue of noise, health and noise activism (6): a regulatory history was very active between 1968 and 1981, and important documents released at the time (7, 8, 9) are still very relevant since they have not been superseded by any more recent studies conducted in the US (10). However, in 1981, based on the rationale that noise does not constitute a health hazard, the subject was deliberately sidelined by defunding the enforcement of the Noise Control Act (9) and closing down the Office of Noise Abatement and Control in the US Environmental Protection Agency (10, 11), with dramatic consequences for public health and society (10, 12).

It was therefore evident that, by acknowledging again the importance of noise pollution, the US National Science Foundation gave a highly significant indication of changing priorities in the USA - a signal, which cannot be ignored. Against this background, New York City seemed to be the most appropriate location for the research stay. On one hand, in 2007 the City enforced the Noise Code updated for the first time in 30 years to address “public health, comfort, convenience, safety, welfare and the prosperity of the people of the city.” (13). On the other hand, it is home of very innovative

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projects on noise monitoring - such as SONYC (5) and “Citygram NYC Sound Mapping” (14) - and of programs on noise education - such as the “Sound and Noise Module” recently adopted by the NYC Department of Environmental Protection (15). There is also evidence of a certain interest on the issue of quiet areas: the NYC Department of Parks and Recreation has designated official “quiet zones” where regulated uses are prescribed. Furthermore, in 2013 the New York Times launched the Finding the Quiet City project: a public call to New Yorkers to crowdsource quiet pockets in the city, which resulted in more than 800 entries.

The study was conducted in New York City (USA) between February and May 2019 with the aim of: studying current policies and regulations related to quiet areas; researching state-of-the-art projects across the fields of urban design, placemaking and acoustics, which can positively impact the sonic quality of urban public spaces; conducting field work to study existing and potential everyday quiet areas in Manhattan; and disseminating the soundscape concept and methods (1, 16) among scholars, professionals, activists and the public.

In detail, this paper outlines the research methods and dissemination activities conducted in New York, such as desk research, interviews with stakeholders and on-field data collection through soundwalks and the use of the Hush City app. It discusses preliminary results, focusing on the outputs of desk research, interviews and the soundwalk conducted for the 2019 International Noise Awareness Day. In conclusion it reflects on the application of standardized methods to study everyday quiet areas in densely populated, large cities, such as New York and outlines future research directions.

## 2. RESEARCH METHODS AND DISSEMINATION ACTIVITIES

Within the context of the four-month research stay in New York, research and dissemination activities were conducted according to a work plan defined in advance (see Table 1). They included: desk research, interviews with stakeholders, in-situ data collection through soundwalks and fieldwork activities as well as the organization of a workshop at the New York University and two presentations at international conferences in the US.

Table 1: Work Plan of the research study in New York (USA)

	February 2019	March 2019	April 2019	May 2019
<b>Desk research</b>	Desk research	Desk research	Desk research	Desk research
<b>Interviews</b>	Interviews	Interviews	Interviews	Interviews
<b>In-situ data collection</b>	-	Fieldwork	Fieldwork	Fieldwork
	-	-	Soundwalk no. 1, 2	Soundwalk no. 3
<b>Workshop</b>	-	-	NYU Workshop	-
<b>Conferences</b>	-	-	-	Conference no. 1, 2

Desk research was conducted throughout the duration of the research stay to collect information on the state of the art of policies and projects on noise, quiet areas and sustainable urban design and planning, with a focus on the city of New York. Documents accessed included: national and NYC policies on noise, NYC regulations on quiet areas, policies, documents and projects addressing city planning, urban mobility, sustainability, privately-owned public spaces (POPS) and public spaces and alike. Literature review was also conducted to find relevant publications, including papers and books. Data collected through desk research were exploited to design the questions for the interviews with stakeholders as well as to define and verify fieldwork activities, following an iterative model.

Twenty-seven interviews were conducted with stakeholders from the academic, public, not-profit and private sectors. The list of potential interviewees was prepared in advance before the start of the research stay and it included leading experts in the field of noise, health, citizen science and urban planning, activists and representatives of NYC Departments, not-profit organizations, urban design and engineering firms and foundations supporting sustainable urban programs. In the case of interviews with public official of the NYC Departments a list of questions was provided prior to the interviews. The kind of questions varied according to the area of specialism of the interviewees and they were open-ended. Data collected through the interviews were used to orientate and double-check fieldwork activities.

From March to May 2019, in-situ data collection was conducted in existing and potential urban quiet areas mainly in the Manhattan Borough through fieldwork activities conducted by the author and group soundwalks guided by the author. The list of urban quiet areas included the NYC official

“quiet zones” and potential new quiet areas, which were identified during the course of the study through desk and fieldwork research and insights given by the interviewees and the participants in the soundwalks.

Fieldwork activities were mainly conducted by the author in 70+ POPS and public spaces in the borough of Manhattan, from Harlem down to Lower Manhattan, e.g. in Harlem, Morning Heights, Central Park, Upper West Side, Midtown, Chelsea, West and East Village, NO.LI.TA, Little Italy, Soho, Bowery and Lower Manhattan. Other public spaces were inspected in Brooklyn. Data were collected by means of pictures, *sonicshots* (short videos of up to twenty seconds), observational notes and sketching, when the site design was relevant to the creation of small islands of quietness. The POPS and public spaces, which could be considered as potential quiet areas, were also mapped by using the Hush City app - a mobile app for iOS and Android which allows the crowdsourcing of mixed, geo-referenced and time-stamped data of quiet areas linked in real time to a web-based, open access platform (17, 18). Mixed data collected with Hush City app at the quiet areas include: audio recordings, sound level measurements, pictures and personal responses, given by replying to the pre-defined questionnaire embedded in the Hush City app, which is composed of twenty questions addressing the multifaced aspects of the environmental experience (18).

In-situ data collection was conducted also by means of three group soundwalks in the West Village (Soundwalk no. 1 and no. 2) and in Little Italy (Soundwalk no. 3) in Manhattan, New York.

A soundwalk is “a walk in an area with a focus on listening to the acoustic environment” (16): as an educational and research practice, it was firstly experimented in the 1960s by Michael Southworth and in the 1970s by the members of the World Soundscape Project (19, 20, 21, 22, 23). Since the early examples of soundwalks, scholars and practitioners have explored a huge variety of methods within the arts and humanities, social sciences, ecology studies and engineering (24, 25, 26, 27). More recently, soundwalks as a method of conducting scientific research have been defined by the ISO norm on soundscape with the aim of unifying its application, thus facilitating comparative studies (16, 28).

The three soundwalks were conducted with the goal of collecting data of existing and potential quiet areas in Manhattan, and raising awareness on the importance of protecting quiet areas as an effective measure to reduce exposure to noise pollution and enhance the benefits of accessing and spending time in public spaces and green areas in the midst of noisy Manhattan.

Soundwalks no. 1 and no. 2 were conducted within the context of the activities promoted by the Acoustical Society of America for the celebration of the International Noise Awareness Day 2019 (INAD2019) (29) and they were supported by the NYU Professor Tae Hong Park and noise expert Dr. Arline Bronzaft.

Soundwalk no. 1 took place on April 8<sup>th</sup> 2019 at 1 PM in the Washington Square Park area (West Village): it was guided by the author with the NYU Professor Tae Hong Park and noise expert Dr. Arline Bronzaft and a group of five NYU graduate and PhD students. Participants were guided along a pre-defined path and they used the Hush City app to evaluate and collect data at the three quiet areas (locations) along the path. At the end of the soundwalk, a group discussion took place and Dr. Bronzaft reported on the history and evolution of noise policies and activism in the US and NYC.

Soundwalk no. 2 took place on April 24<sup>th</sup> 2019 at 1 PM in the Washington Square Park area (West Village), within the context of the workshop organized at New York University (NYU) for the celebration of INAD2019 (see below). The soundwalk was guided by the author and it was open to the public. It was attended by twenty-three participants, attendees of the NYU workshop and other people interested in the soundwalk, who were guided along a pre-defined path and invited to evaluate and collect data at the three potential quiet areas (locations) along the path, by using the Hush City app. At the end of the soundwalk, a group discussion took place and paper forms were distributed among the participants to collect written open-ended feedback on the soundwalk.

Both the soundwalk no. 1 and no. 2 were conducted along the same pre-defined path, composed of three locations, where the group stopped, listened to the environment for several minutes and afterwards collected data by using the Hush City app. The locations were selected so as to make the participants evaluate the potential quiet areas and experience diversity in terms of location size and morphology, activities and acoustic environments. The three potential quiet areas (locations) were: Washington Square Park (Location 1), Winston Churchill Park (Location 2) and the Sasaki Garden (Location 3) (see Figure 1).



Figure 1: Images showing the 3 locations of the soundwalks no. 1 and 2. From left to right Washington Square Park (Hush City #2187), Winston Churchill Park (Hush City #2199), and the Sasaki Garden (Hush City #2210).

Soundwalk no. 3 took place on May 16<sup>th</sup> 2019 at 5 PM in Little Italy, within the context of the Elizabeth Street Community Garden program. The soundwalk was guided by the author and it was open to the public. It was attended by seven participants, who were guided along a pre-defined path and invited to evaluate and collect data at the three potential quiet areas (locations) along the path, by using the Hush City app. At the end of the soundwalk, a group discussion took place and paper forms were distributed among the participants to collect written open-ended feedback on the soundwalk.

The locations were selected so as to make the participants evaluate the potential quiet areas and experience diversity in terms of location size and morphology, activities and acoustic environments. The three potential quiet areas (locations) were: the Basilica of San Patrick's Old Cathedral (Location 1), M'Finda Kalunga Garden (Location 2) and Elizabeth Street Community Garden (Location 3).

In April and May 2019, dissemination activities were also conducted, including a workshop and two presentations given at international conferences in the US.

On April 24<sup>th</sup> 2019, the workshop, titled "Noise, Quietness, and the Healthy City" (30) was held at the New York University for the celebration of the International Noise Awareness Day (INAD), which was founded in 1996 in New York City by the Center for Hearing and Communication (CHC) with the aim of raising awareness about noise effects on hearing, physical and mental health, and overall well-being of people worldwide.

The workshop was organized by the author, NYU Professor Park and Dr. Bronzaft, with the support of (in alphabetical order): the Acoustical Society of America, Center for Hearing and Communication, GrowNYC, HEAD-Genuit Foundation, New York City Department of the Environmental Protection, New York University, NoiseGate, Technical University of Berlin, The Quiet Coalition and the Trust for Public Land. The workshop was aimed at raising awareness on the importance of reducing noise pollution in parallel to protecting quiet areas, as recommended by (3), by engaging the NYC community with expert talks and soundwalks that could provide answers to important questions about city noise and quiet areas. The workshop was open to the public and it involved a full day of community engagement through talks and discussions as well as an outdoor soundscape exploration session (i.e. the soundwalk no. 2) around the Washington Square Park area. Participants in the soundwalk were guided by the author to listen to West Village soundscapes with a focus on quiet areas along a predetermined pathway. Participants were also invited to use the free Hush City app to measure, capture, map, and evaluate precious quiet areas (18). The soundwalk was followed by a group discussion on data collected from the soundwalk and access to the CHC Mobile Unit offering hearing screenings and sound demos. Invited speakers at the morning session included (in alphabetical order): Adrian Benepe, Senior Vice-President and Director of National Programs, The Trust for Public Land; Arline Bronzaft, Ph.D., Board member, GrowNYC; Nancy Nadler, MED, MA, Deputy Executive Director, Center for Hearing and Communication; Tae Hong Park, Ph.D., Professor at New York University; Antonella Radicchi, Ph.D., TU Berlin Researcher and HEAD-Genuit Foundation Fellow; Charles Shamoon, Esq., New York City Department of the Environmental Protection (DEP).

In parallel, in May 2019, two presentations were given by the author at two conferences in the US: the 177<sup>th</sup> Meeting of the Acoustical Society of America in Louisville, Kentucky, and at the 50<sup>th</sup> Environmental Design Research Association Conference in Brooklyn, New York.

### 3. PRELIMINARY RESULTS

Desk research was conducted for the entire duration of the study in parallel to twenty-seven interviews with stakeholders from the academic, public, not-profit and private sectors. in the field of urban design, public spaces and acoustics.

With regard to NYC quiet areas, it emerged that they can be designated by the NYC Department of Parks and Recreation's Commissioner as "quiet zones": areas where "regular and customary use of sound reproduction devices shall be prohibited" and "signs shall be posted in all quiet zones advising the public of such prohibition" (NYC Department of Parks Rules and Regulations). In terms of identification criteria, the NYC Department of Parks and Recreation's Commissioner may designate quiet zones in the parks as the Commissioner deems necessary. This determination is made at the Commissioner's discretion, considering a number of factors including: community input, volume of noise complaints, parks features and intended use of the park space. As of May 2019, there are six officially designated quiet zones at Central Park, including: Sheep Meadow, Strawberry Fields, Conservatory Garden, Shakespeare Garden, East Green and Turtle Pond. The historic list of "Quiet Zones on Parkland" provided by the Commissioner during the interview also included six quiet zones in Manhattan (where no signs are posted, based on the survey made by the author), one quiet zone in the Bronx, two quiet zones in Brooklyn, six quiet zones in the Queens and three quiet zones at Staten Island. However, as reported during the interview, many previous quiet zones are no longer designated as such and the reason remained unclear. Parks Enforcement Patrols are empowered to enforce all posted rules in the parks including the Quiet Zones, although the monitoring of the Quiet Zones is predominantly complaint-driven.

From desk research and interviews conducted, a number of projects and policies were identified as relevant for the creation of quiet areas and healthy public spaces, the reduction of noise pollution and the raising of civic awareness, such as: the NYC DEP's Sound and Noise Module for school children, from the lower grades through high school, that would teach them about the beauty of good sounds and the dangers of loud sounds and noise (15); the NYC Plaza Program which aims to ensure that all New Yorkers live within a 10-minute walk of quality open space; the NYC People Priority Zones Program which will create car-free zones via a pilot project in Lower Manhattan; the NYC Parks without Borders Program which is aimed at making the parks more inclusive and open to the public by redesigning their borders and proximity areas; the NYC Congestion Pricing Plan which will impose fees on vehicles that enter Manhattan below 60th Street and use the fees to fix the city's subway system and thin out streets that have become strangled by traffic; the SONYC project (5) which has been monitoring noise and its impact on people, by means of a sensors-based network and a citizen science mobile app (which will be launched by the end of 2019); the implementation of Mack LR all-electric garbage trucks, planned to be tested on the streets of New York City in 2020; the NOISY project, an AI Powered Automated Airplane Noise Reporting System that can automatically send noise complaints to participating local airports and, even more importantly, save evidential data for future use (32).

In-situ inspection and data collection of existing and potential quiet areas was made in March, April and May 2019 via fieldwork activities and three soundwalks.

Fieldwork activities were conducted by the author in 70+ POPS and public spaces in the borough of Manhattan, from Harlem down to Lower Manhattan. The POPS and public spaces, which could be considered as potential quiet areas, were also mapped by using the Hush City app, and they will be used to create a report of everyday quiet areas in Manhattan (in progress).

In parallel, three soundwalks were conducted between April and May 2019 in Manhattan with overall 30+ participants. In detail, soundwalk no. 2 held on April 24<sup>th</sup> 2019 for INAD2019 was attended by twenty-three participants, including a hearing-impaired person. Participants were given the possibility to map and evaluate the potential quiet areas along the path by using the Hush City app (18). In terms of user behavior, preliminary results show that out of the twenty-three participants, fifteen used the Hush City app during the soundwalk collecting overall thirty-one datasets. In detail, twelve participants used the app at the Location no. 1, nine participants at the Location no. 2 and ten participants at the Location no. 3. Users #4038, #4039, #4042, #4071 and #4072 used the app at all the three locations (see Table 2). One participant (user #4072) collected three additional datasets after the end of the soundwalk, presumably on their way back home.

Due to the limited amount of data, a qualitative approach was applied to evaluate the perception of the potential quiet areas by the participants who used the Hush City app's questionnaire to evaluate the three locations. Table 2 shows the participants' replies to question no. 3 and no. 4 of the survey

embedded in the Hush City app. Location no. 1 was perceived “lively” by the majority of the Hush City app’s users and it was rated as “not quiet” and “slightly quiet”. Location no. 2 was rated as “fairly quiet” and positively perceived by the app’s users: the majority of the semantic descriptors chosen were indeed positive, i.e. “relaxing”, “familiar”, “pleasant”, “lively”, “meaningful”, “natural”. Only one app’s user perceived the location as “confusing”. Location no. 3 was rated as “quiet” and “very quiet” by the majority of the Hush City app’s users and very positive semantic descriptors very chosen accordingly, i.e. “pleasant”, “relaxing”, “beautiful”, “preferred”, “familiar”. However, one user perceived the location as “boring”.

Table 2: Preliminary results of the data collected by the Hush City app’s users at the three locations during the soundwalk no. 2 conducted on April 24<sup>th</sup> 2019 at 1 PM in the West Village, New York.

	Location no. 1		Location no. 2		Location no. 3	
	12 datasets, #: 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2195		9 datasets, #: 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204		10 datasets, #: 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214	
# Users	Replies to Q.3	Replies to Q.4	Replies to Q.3	Replies to Q.4	Replies to Q.3	Replies to Q.4
3501	Lively	not quiet	Pleasant	slightly quiet	-	-
4026	Unpreferred	not quiet	-	-	-	-
4038	Lively	fairly quiet	Lively	slightly quiet	Boring	fairly quiet
4039	Familiar	slightly quiet	Meaningful	fairly quiet	Familiar	fairly quiet
4040	Lively	slightly quiet	-	-	-	-
4042	Lively	fairly quiet	Relaxing	fairly quiet	Pleasant	very quiet
4071	Lively	slightly quiet	Familiar	fairly quiet	Relaxing	quiet
4072	Lively	not quiet	Confusing	fairly quiet	Pleasant	quiet
4073	Lively	slightly quiet	Relaxing	fairly quiet	-	-
4075	Stressing	not quiet	-	-	Beautiful	fairly quiet
4076	-	-	Natural	fairly quiet	Relaxing	very quiet
4077	-	-	-	-	Pleasant	quiet
4078	Familiar	not quiet	-	-	Preferred	very quiet
4079	Friendly	not quiet	-	-	-	-
4081	-	-	Familiar	fairly quiet	Pleasant	quiet
<b>Preliminary Results</b>	Lively (7), Familiar (2), Friendly (1), Stressing (1), Unpreferred (1)	Not quiet (6), Slightly quiet (4), Fairly quiet (2)	Relaxing (2), Familiar (2), Pleasant (1), Lively (1), Meaningful (1), Natural (1), Confusing (1)	Fairly quiet (7), Slightly quiet (2)	Pleasant (4), Relaxing (2), Beautiful (1), Preferred (1), Familiar (1), Boring (1)	Quiet (4), Very quiet (3), Fairly quiet (3)

At the end of the soundwalk, paper blank forms were given to the participants to invite them to write down their thoughts and comments on the soundwalk. Out of the twenty-three participants in the soundwalk, sixteen filled the forms in and returned them. A qualitative approach to data synthesis was applied to evaluate the written feedback provided by the participants at the end of the soundwalk. Preliminary results show that the participants “really appreciated” the soundwalk and through it they “discovered new quiet spaces in the city”. For a former resident of the neighborhood the soundwalk was “a chance [to experience] emotions and memories”. For another participant the soundwalk favored “an understanding of [their] own aural experience”. The selection of the locations was considered “very focused on quiet” and appropriate, “distinguishing the many aspects of sounds within few blocks”. The app was defined as a tool “that could be used to be part of a social change” and “a good [one] for children too”, and the “use options that the app has” and its “user-friendliness” were appreciated by the participants in the soundwalk. A participant suggested to “bold/enlarge the text” of the app. A “practitioner in the city” found “the app and the approach useful and helpful in understanding the importance of subjective environmental acoustic awareness”. Participants who could not use the app took advantage of the paper forms to provide feedback on their favorite location, the third one, defined as “the quietest”. The participation of a hearing-impaired person in the

soundwalk raised methodological issues among the participants. For example, a participant reported questions related to “what we could learn from the individuals with hearing loss” and whether “we could structure a perceptive walk for those who don’t experience the sonic environment in the same way as those with hearing abilities”. The hearing-impaired person reported that they “focused on the birds, birds and water going up and down. [They] enjoyed seeing New York newly and [...] loved the blowing trees, birds and another symbols (signs) of nature. [...] [They] applaud what [the soundwalk’s leader, i.e. the author] is doing”, suggesting to “write a book [...]. Sound it out. Found that sound!”.

#### **4. CONCLUSIONS**

This paper presented a research study conducted by the author in New York between February and May 2019 where the soundscape approach (1, 6) was applied to study existing and potential everyday quiet areas (4), by means of: desk research, interviews with stakeholders and on-field data collection through soundwalks and the use of the Hush City app (18). Preliminary results were discussed, focusing on the outputs of desk research, interviews and the soundwalk guided for the 2019 International Noise Awareness Day. From the latter, the validity of soundwalks as research and dissemination methods emerged. The use of the Hush City mobile app was also found appropriate by the participants in the soundwalk as a tool that can facilitate the collection and sharing of mixed data and “that could be used to be part of a social change”. Challenges regarding the use of the app under not-controlled conditions were noted, i.e. for the soundwalk no. 2 led with the big group of participants, where data collection was not consistently performed by each participant at each location along the soundwalk’s path. However, considering the increasing trends in the use of mobile apps for collecting mixed data in the field of soundscape, citizen science and urban design and the extent to which these tools can facilitate public participation (31), it is recommendable that the design, building and implementation of mobile apps are standardized by ISO norms on soundscape research. The participation of a hearing-impaired person in the soundwalk raised methodological issues, opening up potential new research paths addressing “perceptive walk” as a standardized method for those who are hearing- and visually-impaired. Further research addressing this gap of knowledge is advisable, especially within the context of ISO norms. These advancements could contribute to the definition and development of methods and tools to plan healthier, quieter and more inclusive cities.

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