

PhD

Poster

Between water and stone—computational sonic analysis of anthropogenic transformations: the case of the Grabiglioni in Matera

ABSTRACT | This project investigates a historical water channel, Grabiglione Barisano in Matera, as both an infrastructural artefact and an aural site of memory. Once central to the hydraulic system of the city, the channel now lies invisible beneath the urban surface, yet continues to shape the cultural imagination of the Sassi. This research combines hydromorphological data, GIS analysis, and interactive sound technologies to reframe the Grabiglione as a living archive of ecological processes and human interventions. At its methodological core lies the use of sonification, which renders hidden transformations of the urban environment perceptible through sound. Parameters derived from hydrological modelling, such as the lowest stream points, the collector intake elevation, and runoff thresholds, are translated into sonic features via a Max MSP patch that triggers AI-generated samples produced through img-to-audio algorithms trained on both historical and contemporary images of the site. The resulting system produces sound events that reflect both the historical function and the contemporary disappearance of the Grabiglione, enabling experiences that are simultaneously analytical and affective. This process is executed through site-specific installations, soundwalks, and listening sessions with local communities. These participatory practices create opportunities for reflection on ecological fragility, cultural memory, and the politics of water management. Expected outcomes include the development of immersive installations, new insights into listening as a spatial analysis tool, and the construction of an “emotional cartography” that links sound, space, and memory. Ultimately, this work positions sonification not only as an artistic medium but also as a critical research method capable of bridging technical analysis and embodied knowledge within the discourse on “New Ecologies.”

1. Introduction

The Sassi of Matera evolved through centuries of adaptation to terrain and water flows, with cisterns and drainage shaping settlement (Gambetta & Statuto, 2016). As one of these channels, the Grabiglione Barisano once carried rainwater to the Gravina canyon but now lies unseen.

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This research reimagines the Grabiglione not only as an engineering artefact but as a channel of ecological and cultural memory. It is guided by three questions: How can sonification of hydromorphological data reveal hidden processes and stimulate awareness? How can participatory listening (soundwalks, installations) generate knowledge of city-water relations? Which criteria allow assessment of the artistic and epistemic validity of such systems?

2. Methodology

The approach combines scientific analysis, artistic translation, and participatory inquiry. Data Collection: GIS mapping and hydrological modelling provide three key parameters:

- The lowest topographic point of the stream
- The lowest elevation of the collector intake
- The average runoff threshold post-rainfall

Acoustic measurements and field recordings supplement these datasets.

Artistic Translation: Parameters are mapped to sonic features in a Max MSP interactive patch. AI-generated samples, obtained through img-to-audio algorithms trained on images of the Grabiglione, are triggered through the patch. Data sequences govern temporal unfolding, timbral shifts, and spatialisation, ensuring correspondence between hydrological values and sonic events. This step is not only technical but methodological, as the translation rules are explicitly defined and replicable. Participatory Methods: The system is tested through installations, soundwalks, and listening sessions with local communities. Gathered reflections from short interviews provide qualitative data on processes through which auditory experience fosters ecological awareness.

3. Expected Results

The project anticipates outcomes on three levels:

Artistic - Installations and sonic walks reconstruct the Grabiglione's hidden path, transforming archival and hydrological data into multisensory experiences. Sounds evoke presence rather than merely representing data, recalling aural architecture (Blessner & Salter, 2007).

Epistemic - Sonification is expected to highlight hydromorphological transformations more intuitively than cartography, showing listening as a spatial analysis tool.

Social/Ecological - Combining sound, space, and memory, the work builds an emotional cartography (Viti & Lupo, 2020), fostering awareness of urban metabolism and fragility. Evaluation criteria

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include clarity of sonification rules, participants' ability to articulate new understandings of the Grabiglione, and replicability of the framework in other contexts.

4. Conclusions

Positioning sound as a research method, this project reconceives the Grabiglione as a living archive of urban metabolism rather than buried infrastructure. It demonstrates how sonification can bridge technical analysis and experiential knowledge, offering a model for dialogue between ecology, heritage, and sound design. Sound emerges not only as an artistic medium but as a critical tool for sensing transformation and reactivating memory where infrastructure has silenced natural processes.

References

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Fig.01: cross-sections of the Grabiglione Barisano water infrastructure.

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