

Role of acoustical measurements and predictions in soundscapes : challenges and prospects

Mike Goldsmith

Acoustics is only part of the answer ...

To be pleasant, a soundscape must be accompanied by effective non-acoustic characteristics, such as

- visual amenity

- safety

- accessibility

This is not just because non-acoustic factors add to the pleasantness of a space, but also because they make people experience it as quieter:

Swiss/German study :
number of people
annoyed by traffic noise
is significantly smaller –
all other factors equal –
in more attractive streets

100 metres of natural forest
attenuates noise by 20 dB,
together with an additional
5 dB of subjective
improvement

If soundscapes are more than acoustics, then what is the place of (acoustic) measurement here?

- Acoustics still the main factor in a soundscape
- Well-defined and fully standardised measurement protocols – more than for other relevant parameters
- If the "acoustics" of pleasant/unpleasant soundscapes can be captured and correlated then this
 - allows preliminary selection of spaces most likely to benefit from modification
 - helps guide soundscape construction
 - permits cost/benefit analyses and hence makes funding more likely
- Ideally, a measurement-based system could analyse a "bad" soundscape, specify how to improve it and predict the improvement in people's well-being.

Predict instead of/as well as measure?

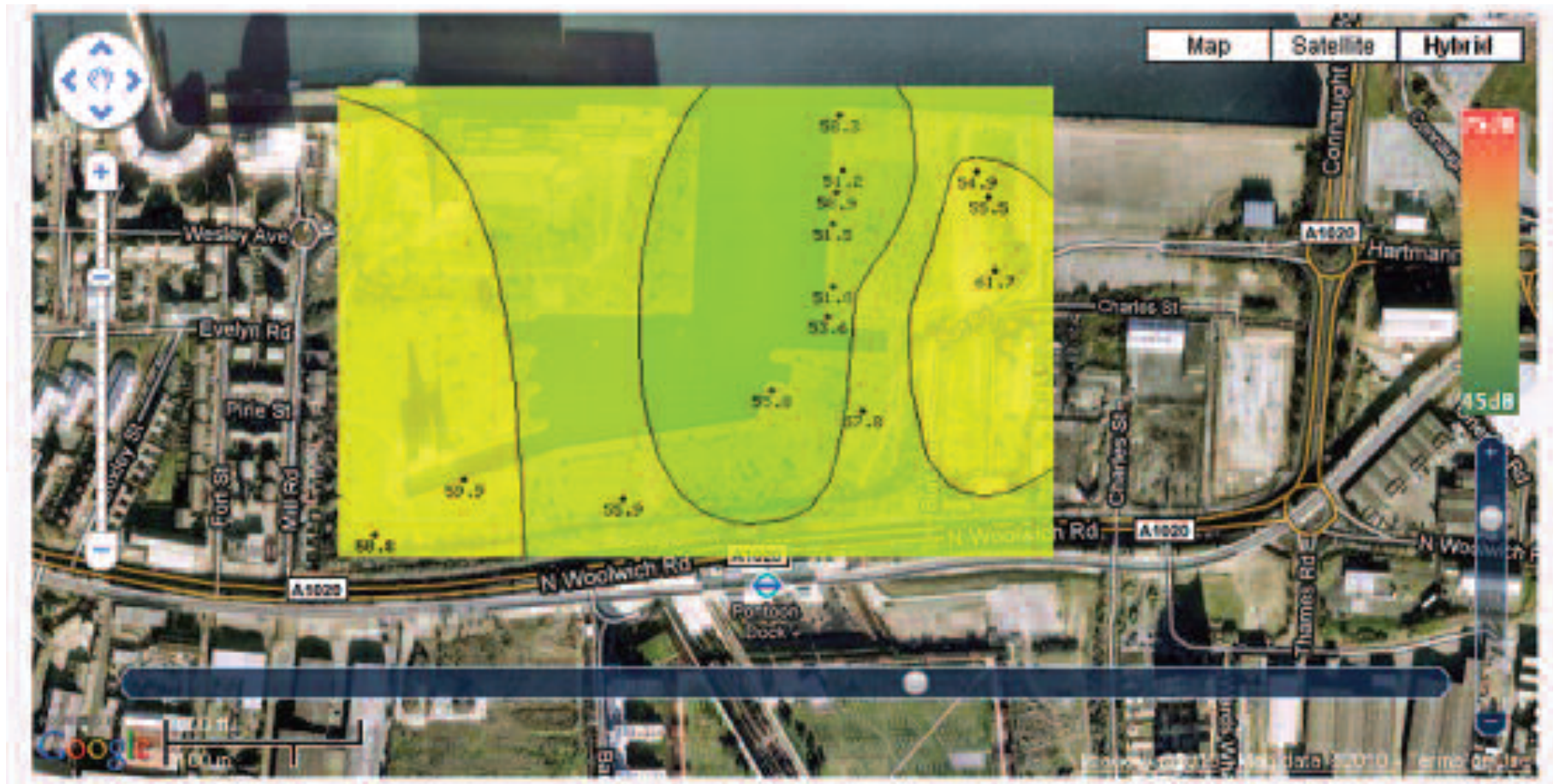
The prediction of a sound field can be done effectively for transport sources and some others

BUT far less well for such sources as fountains, birdsong and wind-blown trees, any of which may be chosen to modify a sound field.

So, pure prediction useful as broad indicator only.

Predict and Measure?

Multipoint, long-term, measurement arrays using low-cost microphones. Accuracy low, but can be used to constrain and extend predictions



Knowledge of sound field is only part of requirement...

- ... we need to understand its effect on soundscape users.
- Impact can be predicted to some extent
- e.g. well-quantified relation between noise and annoyance.
- BUT this a red herring in the soundscape context as modified soundscapes are often louder than their initial versions.

So, measurement-based prediction of sound field and its effects is possible...

... and would assist in assessing locations under consideration for soundscape modification, allowing:

- identification of areas where the extant soundscape is too challenging to modify
- targeting times, locations within the area and frequency ranges which have the largest negative impact
- quantifying cases for funding applications

In combination with surveys/interviews, this approach could also be used to characterise what it is about modified soundscapes that has proved effective or ineffective, to guide future work

Other points

- Soundscape modification (whether intended or not) is one in which literature review and collation of best practice is of great benefit.
- Informal reviews show that involving the prospective beneficiaries in the planning and the review stages of the modification is crucial: the feeling of being in control of one's acoustic environment, if only to a small extent, has a significant impact on its impact.
- A best practice guide would be very useful, including case-studies of both successful and ineffective modifications (and likely to secure funding).

Conclusions

- Acoustics is part of the answer
- Measurements and predictions have important parts to play, especially if used together. They need not be highly accurate.
- New "naturalness" parameter?
- Literature reviews / best practice guides of great benefit