Waterscape and Soundscape in Sheffield

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Nature, History, and Urban Form

- The city’s first settlement developed at the confluence of the Rivers Don and Sheaf, around the 12th century. With the role as a market town at this time, Sheffield has continued to be shaped by waterways to the present day.

- Since the middle ages, Sheffield’s access to abundant natural resources has made it an ideal centre for a thriving iron and steel industry.

- By the late 14th century, Sheffield was famous for its metal knives and its role in this industry.

- By the late 18th century, all available sites on the rivers were developed.

- In the 19th century, Sheffield became the principal location in Britain for large steel works.
Rivers and the City

12th CENTURY
- **Rivers Don and Sheaf**
  Production and industry at the time of Sheffield’s first settlement

18th CENTURY
- **Water Powered Mills along River Banks**
- The greatest concentration of over 100 water powered sites in the UK
- **Dams**
- Produce maximum power to the numerous mills

19th CENTURY
- **Tinsley Canal**
- Connections for large steelworks

1980s
With the decline of the Sheffield steel industry whereby the **Rivers Don** lost its traditional function and became a forgotten part of the city.

**TODAY** It is essential that this reconnection with the rivers continues to be fostered and their role in the history of the city celebrated.
Regeneration

- Post war rebuilding saw the redevelopment of individual city sites as well as large scale civic planning and road development schemes, which resulted in the loss of much of the original grid street pattern.

- The decline of the steel industry in the 1980s further changed the character of the city blighting the urban landscape by leaving redundant industrial buildings and vacant sites.

- Major public realm improvements to the city centre with projects such as the pedestrianisation of Barker’s Pool and Tudor Square which have injected life back into the city centre in the 1990s.
The Gold Route

Under the regeneration of the Sheffield City, waterscapes and squares were embedded into the city for its vibrancy with the respect of the history of Sheffield.
Among many other water-related schemes, such as hydropower...
Diversity of Waterscapes

• BARKERS POOL

• PEACE GARDENS

• MILLENIUM SQUARE

• HOWARD STREET AND HALLAM GARDEN

• SHEAF SQUARE
Waterscape and Soundscape

Receiver at 1m from water
Based on 1000 samples. Also, comparison between different countries
BARKERS POOL

1 m from source

4 m from source

9 m from source

19 m from source

Change of soundscape when moving away from the water
Soundscape from water and other sounds for studying masking effects.....
Large Fountain in the Peace Gardens

Change of soundscape when moving away from the large fountain
Figure 8.4 The comparison of the sound spectra in the Peace Gardens

Soundscape map
SHEFFIELD

MILLENNIUM SQUARE

Ball fountain in the Millennium Square

The sounds from the ball fountains are hardly to be heard…
Contrary to the Peace Gardens nearby, the square is much more quiet.
The fountain in Howard Street

Recording point is one meter from the sound source.
1. Steel barrier
2. Medium cascade
3-6. Big fountain (1,3,5,10m)
7. Small cascade L1
8. Small cascade L3
Water Diversity

Big Fountain
Small Cascade L3
Medium Cascade
Steel Barrier

Big fountain
Small Cascade L3
Medium Cascade
Steel Barrier
Big Fountain
Change of soundscape when moving away from the large fountain
Steel Barrier

1 m from road

Traffic Noise

1 m from source

Behind Steel Barrier

Traffic Noise

Behind Steel Barrier
Psychoacoustics

Roughness vs. Time

Barkers Pool

Howard Street

Peace Gardens

Medium Cascade

Steel Barrier

Big Fountain

Small Cascade (L1)

Small Cascade (L3)

Traffic Noise
Psychoacoustics

Fluctuation Strength vs. Time

- Barkers Pool
- Howard Street
- Peace Gardens
- Medium Cascade
- Steel Barrier
- Big Fountain
- Small Cascade (L1)
- Small Cascade (L3)
- Traffic Noise
## Psychoacoustics

<table>
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<th>Psychoacoustic Indices</th>
<th>Fluctuation Strength (vacil)</th>
<th>Loudness (FFT / ISO 532 B) (soneGF)</th>
<th>Roughness (asper)</th>
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Concluding Remarks

• Waterscape + soundscape interactions
  – Added richness of spaces and city environment
  – Soundmarks, cultural values
  – Enhanced quality
• Function of reducing noise annoyance
• Diversity of water soundscapes
• Research (on-going)
  – Masking (attention and energetic), with Korea team
  – Music information retrieval (MIR) techniques
  – Soundscape structures
Acknowledgements

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