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The ANC Sustainability Series

Biodiversity in Acoustics

Raising the profile of sustainability within ANC member companies

ANC Sustainability Committee

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Introduction

Human activity over the years has degraded habitats and eroded ecosystems, losing plant and animal species in the process. To address the loss of species, it is crucial that biodiversity-rich natural places are protected and restored, and new ones are created. This is part of the UN's Sustainable Development Goals 14 (life in the sea) and 15 (life on earth) [1].

Acousticians can play their part to ensure that, through their work, biodiversity is enhanced and not further degraded. Planting or seeding areas of new habitat and restoring other areas to a more natural state through careful management are both important steps in creating places where local plants and animals can thrive. As part of an attempt to help nature recover and flourish by itself.

The main benefit from habitat creation and rewilding is to become more resilient. By planting new trees and increasing vegetation, carbon can be captured and the effects of climate change minimised. Flood risks and soil erosion processes can also be reduced. The new environments can be an opportunity for socio-economic development while also improving the health and wellbeing of everyone involved.

As acousticians, noise pollution in both the sea and the earth is our main battle. Habitat creation and restoration efforts, including rewilding, can become positive strategies for noise mitigation and soundscaping. This summary on the topic provides a brief overview of how acoustics can work hand in hand with hand in hand with habitat creation, restoration and rewilding, no matter how big or small.

Recovering Habitat

It is important that a variety of habitats are protected or reintroduced. A few ideas to achieve this are listed below.

- It is common for barriers to be used to help reduce sound from nearby sources to future development. Earth bunds, fences and walls can provide an equivalent acoustic benefit. However, the bunding can be planted to a greater degree and will have a greater ecological benefit over otherwise hard structures [2] [3].
- Distancing different development types can be beneficial in reducing the levels of mitigation required to reduce noise impacts. The areas between development can be used to provide linear habitat features which will provide movement corridors to enable animals to migrate between strategically placed ecology areas.
- Soft ground landscaping and planted facades, such as grass or planted areas can help reduce sound propagation over large distances and within built up development areas [4]. These areas can serve a much needed habitat for animals, particularly insects which have seen a sharp decline in numbers over the last 20 years, due to rising temperatures and fragmented habitats [5].
- Although, narrow trees belts and hedges between a sound source and the receptor have little benefit in reducing direct sound levels, studies have shown that sounds of nature are perceived more positively if accompanied by a natural visual environment [6]. Removing the line of sight between the sound source and the receptor can have a significant psychoacoustic effect on the perceived impact of less desirable sound [6].
- As well as providing visual masking and some level of sound absorption in built up areas, trees also help offset carbon contribution by storing it and releasing oxygen. They provide food, shelter, and nesting/roosting spots for many types of wildlife, which can also influence the soundscape.

- Trees can also contribute to the soundscape of an area. The sound produced by trees in the wind, as the leaves rustle, branches sway, and stems creak in the currents of air, can mask less desirable sounds such as traffic. The songs and calls of wild animals attracted to urban vegetation, such as birds and insects, also help to mask urban noise pollution. [8]

  On the soundscape topic, watercourses can be introduced for habitat and sound produced can provide a degree of masking sound from other, less desirable, sound sources [7]. They can also provide a buffer between development areas and can support the recovery of keystone species across the U.K. [9].

Inner city design (green/tranquil pockets in cities)

The visual impact from a naturalistic mitigation solution can also contribute to the perceived value of the area and can serve to benefit people's health and wellbeing [10].

It is generally considered that small areas of planting or green features add little benefit in reducing noise on a site. For example, a green wall may reduce noise from an otherwise reflective surface by only a few decibels. However, little contributions such as this add up when considering sound propagation over a large distance. Minimising semi-reverberant conditions (sound bouncing around between buildings) through increased surface absorption positively benefits the wider area as well as provides natural features for people and animals to benefit from.

However, regardless of the reduction in noise levels, well planted areas are perceived as more pleasant by many people than otherwise hard architecture. This in turn contributes towards a positive perception of a space, where people are more accepting of higher sound levels.

In many cases it is useful to consult with the local community when considering the approach to habitat creation, restoration and rewilding developed areas, as they know the local area better than anyone else.

Using questionnaires and focus groups, the desires of the community can be established (e.g., what sounds used to occur due to wildlife and have now disappeared or what noises the community would like to reduce or mask).

An action plan or map can be drafted using this information which will help inform the approach to create habitat to encourage native, or former native, species.

Construction and operational noise on animals

Several studies demonstrate that the impact of noise on animals varies greatly depending on the specific biology of the animal and their individual hunting and breeding requirements.

The impact on the acoustic environment on the behavioural responses of different animals is complicated and hence, it is important for the appropriate experts to be consulted when looking at construction noise and operation noise impacts to ecological areas/habitats [11] [12] [13] [14].

It is well known that an area's ecology is highly dependent on keystone species and care must be taken to ensure that adverse effects on animals' ability to cohabit and thrive in developed areas is not adversely affected by poor design choices [15].

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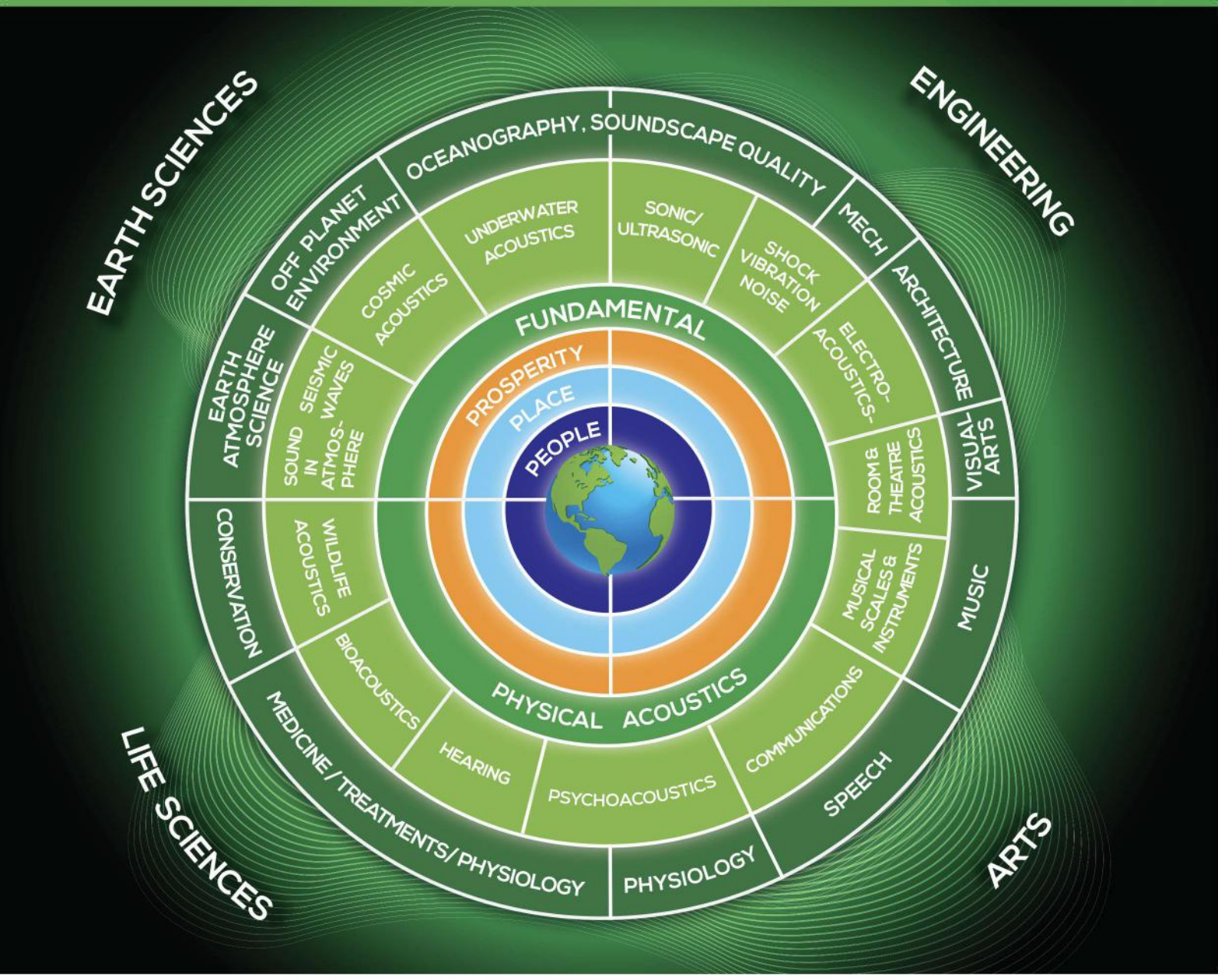
ANC ACOUSTICS & NOISE CONSULTANTS

A MODEL OF SUSTAINABILITY IN ACOUSTICS



The Lexicon of Sustainable Acoustics

The lexicon of Sustainable Acoustics, developed by ANC member Peter Rogers in his Internoise paper in 2022, sets out a vision for how acoustics can deliver sustainability. It provides a lens through which ANC members can begin their thinking at the centre with the planet central in their minds adding in the elements like a priority of thoughts through to the rim, on which their discipline may reside. By doing this as a process, the aim will be to embed sustainability into the acoustic solution along the way. An evolution of Lindsay's Wheel of Acoustics, which emerged in 1966 in the Journal of the Acoustical Society of American, identifying eight specific fields, this Sustainable Acoustics graphic illustrates how diverse the area of acoustics is and remains relevant to this day to humanity but also that all species should be considered. It sets out a vision that includes some updates for the new and emerging fields, which will evolve in time, as acousticians need to. This lexicon provides a new framework which acousticians can use to think through and communicate how they deliver acoustics, which combines acoustics and sustainable principles as a lens through which challenges should be approached, can be objectively quantified at delivery in a transdisciplinary way.

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