

Hildegard

Westerkamp's

Beneath the

Forest Floor

*and Graphic Analysis. Regrowing
the Relationship Between Human,
Nature, Society, and Self through
Soundscape Composition*

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ABSTRACT

Hildegard Westerkamp (b. 1946) is a German-Canadian electroacoustic composer, researcher, and educator, best known for her work in acoustic ecology and soundscape studies. She is recognised for her vast soundscape composition oeuvre, her contributions to the World Soundscape Project, and for shaping and popularising the theory and praxis of soundwalk. Westerkamp's musical language is characterised by material derived from the real environment and a strong, ecological message. These traits are embodied in the composer's 1992 piece *Beneath the Forest Floor*.

Based on an analysis of the composition, the paper shows how music can address environmental issues, through the incorporation of real-world natural and human-made sounds. Furthermore, it describes how the electroacoustic transformation of environmental sounds can address their deeper, symbolic, and mythological levels, thus uncovering their cultural and personal associations. The use of totemic sounds in *Beneath the Forest Floor* will also be discussed as a means of invoking (native) cultures' close relationship with nature, thus introducing another social and cultural level to the piece. The paper argues that by incorporating these elements soundscape composition may acquaint listeners and composers with the environment and their inner selves, renew their relationship with the natural world and prompt their engagement with climatic issues. Finally, a graphic analysis of *Beneath the Forest Floor* shall be presented, to suggest that multisensory experience may serve educational purposes postulated by the World Soundscape Project, and therefore complete the environmental, social, cultural, political, and educational aims and levels of soundscape composition.

Keywords: soundscape, acoustic ecology, soundscape composition, graphic analysis, Hildegard Westerkamp

Soundscape composition is a genre of electroacoustic music, rooted mainly in the Canadian tradition of acoustic ecology as developed by R. Murray Schafer and the World Soundscape Project (WSP).¹ It is characterised by recognisable environmental sound and a strong ecological message. However, it not only describes an actual world, but also addresses an array of environmental, social, political, cultural, and self-identity issues, thanks to a concept of sound as rooted in context and as a carrier of information – literal, contextual, metaphorical, and symbolic – on the environmental, individual, and socio-cultural levels.²

The environmental sound is thus viewed according to the soundscape tradition – as acoustic, indexical, contextual, and phenomenologically bound to its source.³ Soundscape composition can, therefore, be situated as one of the elements of the acoustic communication continuum, as described by Barry Truax.⁴ An example of such a composition is *Beneath the Forest Floor* by Hildegard Westerkamp, which depicts a real place, as well as its broad, multifaceted network of meanings with a view to creating and strengthening relationships between the individual, society, and nature.⁵

SOUNDSCAPE COMPOSITION

Soundscape composition stems from the tradition of acoustic ecology with 'soundscape' as a central term, understood as a 'macrocosmic musical composition',⁶ where sound is a carrier of information and a medium for creating relationships between the environment, the society and the individual.⁷ In soundscape (and in soundscape composition), sound is, therefore, never abstract.⁸ Soundscape composition has been

Westerkamp, 'The Local and Global "Language" of Environmental Sound', in Ellen Waterman, ed., *Sonic Geography Imagined and Remembered* (2002), 130.

³ Cf. Jason Leddington, 'What We Hear', in Richard Brown, ed., *Consciousness Inside and Out: Phenomenology, Neuroscience, and the Nature of Experience, Studies in Brain and Mind Series*, 6 (Dordrecht, 2014), 327; Bethan Lucy Winter, 'Listening to East Berlin: Can a Soundscape Be Socialist?', in Marcus Colla and Paul Betts, eds, *Rethinking Socialist Space in the Twentieth Century* (Cham, 2024), 83–106.

⁴ Truax, *Acoustic Communication*, 4–12.

⁵ Cf. Truax, *Acoustic Communication*; Barry Truax, 'Soundscape, Acoustic Communication and Environmental Sound Composition', *Contemporary Music Review*, 15/1–2 (1996), 49–65.

⁶ R.M. Schafer, 'The Music of the Environment', *Occasional Journal Devoted to Soundscape Studies* (1973), 3.

⁷ See: Truax, *Acoustic Communication*; Barry Truax, 'Acoustic Space, Community, and Virtual Soundscapes', in Marcel Cobussen, Vincent Meelberg, and Barry Truax, eds, *The Routledge Companion to Sounding Art* (New York, NY, 2020), 253–63.

⁸ Hildegard Westerkamp, 'Linking Soundscape Composition and Acoustic Ecology', *Organised Sound*, 7/1 (2002), 53; Matthew Burtner, 'Sounding Art Climate Change', in Cobussen, Meelberg, and Truax, *The Routledge Companion to Sounding Art*, 287–288.

¹ Barry Truax, 'Soundscape Composition', [website:] <https://www.sfu.ca/~truax/scomp.html>, accessed 8 July 2022.

² Cf. Barry Truax, *Acoustic Communication*, 2nd edn (Westport, London, 2001); R. Murray Schafer, *The Music of the Environment, The Music of the Environment Series*, 1 (Vancouver, 1977); R. Murray Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World* (Rochester, Vermont, 1994); Barry Truax, 'Sound, Listening and Place: The Aesthetic Dilemma', *Organised Sound*, 17/3 (2012), 193–201; Hildegard

defined by artists and scholars alike, including, among others, Barry Truax,⁹ Hildegard Westerkamp,¹⁰ Leigh Landy,¹¹ David Monacchi,¹² Andrea Polli,¹³ Matthew Burtner,¹⁴ and Brona Martin.¹⁵ As Truax summarises:

The soundscape composition is a form of electroacoustic music, developed at Simon Fraser University and elsewhere, characterized by the presence of recognizable environmental sounds and contexts, the purpose being to invoke the listener's associations, memories, and imagination related to the soundscape.¹⁶

The soundscape composition, therefore, cannot be defined simply as the use of environmental sound; the emphasis is put on its recognisability and identifiable association with the real world.¹⁷ Moreover, the listening agent (the composer or the audience) assumes an active role in the listening process – they must consciously recognise and explore the network of literal and symbolic meanings of environmental sound. This stems from the educational ideals promoted by the WSP¹⁸ and thus from the focus on a clear activist message. Soundscape composition is therefore a type of music characterised by both inner (the relations between musical/technical/sound elements) and outer complexity (the relationship

of the piece to the external world).¹⁹ As Leigh Landy suggests, it is an intention/reception loop that allows the listener to follow the narrative and creates both the meaning and the musical/technical shape of the piece.²⁰ In this sense, a soundscape composition places the listener, the composer, and the environment in an acoustic communication continuum with sound as a mediator and context as a shaping agent. Three aspects of the latter influence the creation, perception, and interpretation of the piece: physical (space, environment, time and circumstance, instrumentation, acoustics, conditions), social (political, cultural, economic, environmental, institutional factors, as well as cultural heritage), and psychological (emotions, archetypes, imagination, metaphors, myths, symbols, dreams).²¹ This inner and outer complexity makes it possible for the soundscape composition to blur the boundary between music and the environment.²² Ideally, the soundscape composition should also influence our understanding of these inner and outer worlds, patterns of perception, and daily habits, encouraging the listener to create a more ecologically balanced relationship with the environment.²³ The soundscape composition can thus be understood as an attempt to communicate with the outer world and discuss our relationship with it.²⁴ The main aim of the genre is to reintegrate the listener with the environment through creating an ecologically balanced relationship mediated by the music, whose inner complexity corresponds to that known from the real world.²⁵ The piece is therefore an immersive universe that reflects and comments on the real one, while exploring its meanings and rules.²⁶

9 See: Truax, 'Soundscape, Acoustic Communication and Environmental Sound Composition', 49–65; Barry Truax, 'Genres and Techniques of Soundscape Composition as Developed at Simon Fraser University', *Organised Sound*, 7/1 (2002), 5–14, and others.

10 See: Westerkamp, 'Linking Soundscape Composition and Acoustic Ecology', 51–56; Westerkamp, 'The Local and Global "Language" of Environmental Sound', 130.

11 Leigh Landy, 'Hildegard Westerkamp's Beneath the Forest Floor', in Miller Puckette and Kerry L. Hagan, eds, *Between the Tracks: Musicians on Selected Electronic Music* (2020), 42–46.

12 David Monacchi, 'Recording and Representation in Eco-Acoustic Composition', in Jøran Rudi, ed., *Soundscape i kunsten: Soundscape in the Art* (Oslo, 2011), 244.

13 Andrea Polli, 'Soundwalking, Sonification, and Activism', in Cobussen, Meelberg, and Truax, *The Routledge Companion to Sounding Art*, 82–85.

14 Burtner, 'Sounding Art Climate Change', 287–288.

15 Brona Martin, 'Soundscape Composition: Enhancing Our Understanding of Changing Soundscapes', *Organised Sound*, 23/1 (2018), 22.

16 Truax, 'Soundscape Composition'.

17 Truax, 'Genres and Techniques of Soundscape Composition as Developed at Simon Fraser University', 6.

18 Truax, 'Soundscape, Acoustic Communication and Environmental Sound Composition', 55.

19 Barry Truax, 'The Inner and Outer Complexity of Music', *Perspectives of New Music*, 32/1 (1994), 176–93.

20 Landy, 'Hildegard Westerkamp's Beneath the Forest Floor', 44.

21 Truax, 'The Inner and Outer Complexity of Music', 176–193; Barry Truax, 'Voices in the Soundscape: From Cellphones to Soundscape Composition', in Dmitri Zakharine and Nils Meise, eds, *Electrified Voices: Medial, Socio Historical and Cultural Aspects of Voice Transfer* (Gottingen, 2012), 61–79; Westerkamp, 'The Local and Global "Language" of Environmental Sound', 130; Polli, 'Soundwalking, Sonification, and Activism', 82–83.

22 Truax, 'Voices in the Soundscape: From Cellphones to Soundscape Composition', 61.

23 Truax, *Acoustic Communication*, 240.

24 Westerkamp, 'The Local and Global "Language" of Environmental Sound', 130.

25 Truax, *Acoustic Communication*, 240–241.

26 Truax, *Acoustic Communication*, 60.

Even though the genre of soundscape composition does not have a predetermined formal structure, certain technical/formal rules of thumb and practices tend to be used. While the presence of recognisable environmental sound distinguishes soundscape composition in a generic sense, individual pieces may vary in the level of abstraction. David Monacchi states that, although all the inner relationships of sounds within the piece should be inspired by or taken from the acoustic configuration of the natural environment, electroacoustic transformations can explore the soundscape's intricacies, rules, and rhythms. He further suggests that technological processing helps to understand the environment's sonic complexity and offers new ways of collaborating and coexisting with it.²⁷ Soundscape composition thus does not rule out creative re-forming and processing of the original material. There is a continuum between 'found composition'²⁸ or 'documentation'²⁹ (a composition with only a minimal level of transformation and transparent editing) and a composition with a high level of sound transformation or even a 'virtual soundscape'. The latter does not represent a real world/place but rather emphasises the exploration of sounds and the environment's hidden meanings, symbols, associations, and metaphors.³⁰

Another variable of the soundscape composition is the perspective. There are three main approaches, as described by Barry Truax:

1. Fixed special perspective – the presented soundscape derives from one place with no sense of movement;
2. Moving spatial perspective – a journey of a continuous space-and-time flow;
3. Variable spatial perspective – a journey of discontinuous space-and-time flow or simultaneous layering of events from different places.³¹

In terms of electroacoustic processing and composition techniques, they vary from the simplest to complicated, including sampling, editing, montage, crossfading, filtering, transposing, rhythmisation, harmonisation,

granulation, convolution, time stretching (including the use of granulation), adding reverb, etc. It is also common for composers to add a (singing, reciting or narrating) voice and/or instruments.³² Regardless of the level of abstraction/transformation, electroacoustic processing and other techniques should not only serve aesthetic purposes but also bring out the complexity of environmental sound and its context, emphasise the symbolism, connotations and metaphors related to the sound.³³ The shape of the composition should stem from the composer's experience with the given soundscape as well as its social, cultural, ecological, individual, and political context.³⁴ Therefore, environmental sound and its recognisable context are crucial for the soundscape composition both in terms of music and message. The listener needs to be an active participant to decode, interpret, and create the network of meanings, as well as reshape the relationships with the environment.

BENEATH THE FOREST FLOOR BY HILDEGARD WESTERKAMP

Hildegard Westerkamp (b. 1946) is a German-Canadian composer, researcher, and educator best known for her artistic and scholarly work in acoustic ecology (also as a WSP member). She has defined and described the practice of a 'soundwalk', understood as 'any excursion

²⁷ Monacchi, 'Recording and Representation in Eco-Acoustic Composition', 244.

²⁸ Truax, 'Sound, Listening and Place: The Aesthetic Dilemma', 194.

²⁹ Monacchi, 238.

³⁰ Truax, 'Sound, Listening and Place: The Aesthetic Dilemma', 194–198; Monacchi, 238–239.

³¹ Truax, 'Genres and Techniques of Soundscape Composition as Developed at Simon Fraser University', 8–12.

³² Cf. Barry Truax, 'Composition and Diffusion: Space in Sound in Space', *Organised Sound*, 3/2 (1998), 141–46; Truax, 'Sound, Listening and Place: The Aesthetic Dilemma', 193–201; Iannis Xenakis, *Formalized Music: Thought and Mathematics in Composition*, *Harmonologia Series*, 6, 2nd edn (Stuyvesant, 1992); Curtis Roads, 'Introduction to Granular Synthesis', *Computer Music Journal*, 12/2 (1988), 11–13; Barry Truax, 'Electroacoustic Music and the Soundscape: The Inner and Outer World', in John Paynter and others, eds, *Companion to Contemporary Musical Thought*, vol. 1 (London, 1992), 374–98; Barry Truax, 'Music and Science Meet at the Micro Level: Time-Frequency Methods and Granular Synthesis', *The Journal of the Acoustical Society of America*, 117/4_Supplement (2005), 2415; Barry Truax, 'Composing with Time-Shifted Environmental Sound', *Leonardo Music Journal*, 2/1 (1992), 37–40.

³³ Truax, 'Sound, Listening and Place: The Aesthetic Dilemma', 195; Westerkamp, 'Linking Soundscape Composition and Acoustic Ecology', 54–55; Monacchi, 240–243.

³⁴ Westerkamp, 'Linking Soundscape Composition and Acoustic Ecology', 54.

whose main purpose is listening to the environment'.³⁵ Her artistic projects are characterised by a strong ecological message and musical material derived from real environments through field recordings, often made by the composer herself. Her pieces frequently incorporate speech or even spoken narrative that comments on the contents of the music, balancing on the verge of a composition and a soundwalk. Even though *Beneath the Forest Floor* does not employ spoken word, it is a rather typical example of Hildegard Westerkamp's musical style, as well as of the genre of soundscape composition. The piece was commissioned by the Canadian Broadcasting Corporation and premiered in 1992.³⁶ The composition focuses on one real place – a forest in the Carmanah Valley (British Columbia). The composer describes it as an *Urwald*³⁷ – German for 'primal forest'. This mythical, primal force of the forest becomes the main theme of the composition, with the trees serving as sentinels of the spiritual force lying within (note that the composer refers to the trees as a 'who', not 'which'³⁸, treating them as persons rather than objects). This image is related to that known from German culture – its fairy tales, folk tales, and romantic art/literature.

The composition comprises solely environmental sounds recorded by the composer, mostly in Carmanah. Only the raven's croaking was recorded by Norbert Ruebsaat in Haida Gwaii.³⁹ All the sounds used in the composition are of natural origin, except for the whine and buzz of a chainsaw. The natural sounds come from the fauna (birds – including ravens, jays, wrens, thrushes – plus insects and squirrels), water (rain, creek, water drops), wind, and trees creaking. Virtually all the sounds appear both in their original and edited form. The transitions between the original and transformed versions are effected differently throughout the composition – either gradually (e.g.

the sounds of water) or abruptly. Sometimes both versions appear simultaneously (raven croak), one immediately after the other (chainsaw), or in different sections of the piece (the squirrel and the wren).⁴⁰ The electroacoustic processing methods applied are typical of the genre and technologically simple, i.e. transposing, filtering, looping, slowing down, adding reverb, etc. They are meant to mould the sounds into specific frequencies, bring out their inner rhythms, textures,⁴¹ acoustic and symbolic qualities.⁴² *Beneath the Forest Floor* is, therefore, an example of a soundscape composition with a high level of sound transformation. It is not a virtual soundscape, as it presents a real place (though it can be argued that it focuses more on its legendary, oneiric, and mythic aspects). The composition is in stereo format, as it was meant for radio broadcasting. In the piece, there is no stable pulse (just as there is no repetitive pulse in the natural environment). There are, however, brief segments of quasi-regular beat (e.g. the looped sound of water drops).⁴³ Locally, the sound moves from right to left or the other way round.⁴⁴ In the whole piece, the listener also experiences movement through parts of the forest (variable perspective – discrete 'jumps' or continuous movement), and through a complex network of associations, symbols, meanings, and emotions connected with the *Urwald* and its destruction. Movement in time is indirectly implied; it is of minor importance for the narrative.

There is no predetermined formal structure in Westerkamp's composition.⁴⁵ It is, however, possible to discern four sections divided by interludes, as Landy suggests.⁴⁶ (While I agree with him, I identify the points of transitions slightly differently). Such an interpretation of the work's structure seems justified due to clear shifts of affect, ambience, acoustic spectrum and predominant sound types. The bridges are neutral and serve as moments of relative peace and respite. The narratives of the individual sections can be summarised as follows:

³⁵ Hildegard Westerkamp, 'Soundwalking', *Sound Heritage*, III/4 (1974), https://www.hildegardwesterkamp.ca/writings/writingsby/?post_id=13&title=soundwalking, accessed 9 Apr. 2025.

³⁶ Hildegard Westerkamp, 'Program Note Beneath the Forest Floor (1992)', *Hildegard Westerkamp*, <http://www.hildegardwesterkamp.ca/sound/comp/2/ForestFloor/index.html>, 26 Aug. 2023.

³⁷ Landy, 54.

³⁸ Westerkamp, 'Program Note Beneath the Forest Floor (1992)'.

³⁹ Westerkamp, 'Program Note Beneath the Forest Floor (1992)'.

⁴⁰ Landy, 49–50.

⁴¹ Landy, 51.

⁴² Hildegard Westerkamp, 'Notes on the Compositional Process', 1992; Landy, 50.

⁴³ Landy, 51.

⁴⁴ Landy, 51.

⁴⁵ Westerkamp's correspondence with Landy, in Landy, 39–62.

⁴⁶ Landy, 52–58.

1. The first part serves as an 'exposition', presenting the various sounds of the forest, including birds (raven, jays, wrens, thrushes), squirrels, and water. They appear in both natural and processed forms. The opening (and later recurring) low, pulsating motive is significant throughout the piece. It serves as a leitmotif of the composition and as a framing device. It also has an important semantic context. Although the motif sounds synthetic, almost otherworldly, it is in fact a strongly processed raven's croak. At the work's opening, this and the original version appear side by side. As Westerkamp claims, she wanted the sound to resemble that of the drum of the native inhabitants of the West Coast of British Columbia. For them, a raven is a totemic animal, and totems are made of wood from the local trees. This illustrates the relationship that used to exist between humans and the forest (nature).⁴⁷ It may also allude to colonialism and the inequality of forces between the native and the conqueror. That, in turn, can be understood further as a parallel to the lack of balance between the natural world and human industrial dominance.
2. The battle between destructive human force (chainsaw) and the ancient, dark, mythical and dangerous power of the forest (storm). The texture becomes much thicker, sound events are dense. Processed animal sounds (mostly jays and squirrels) dominate the low-frequency band. The rain ambient is punctuated by creaking wood and the noise of the chainsaw. As Westerkamp claims, co-occurrence shows the battle between the mythical force of the forest and the contemporary reality of deforestation.⁴⁸
3. The quiet after the storm. This section is an 'environmental counterpoint'⁴⁹ of water and processed birds' sounds. The blur between the real and the imaginary seems the strongest here.
4. The fourth part is a form of a 'reprise'⁵⁰ that reminisces about the natural sounds from the previous sections, framed by the raven's croak.

SOUND, MUSIC, METAPHOR, AND MEANING

'*Beneath the Forest Floor* is an intimate encounter with the forest, its fauna, and its flora [...].'⁵¹ It is a sonic journey through a real place and an exploration of the symbols, associations, and memories related to the sounds. The juxtaposition of natural and processed sounds metaphorically balances the real and the oneiric-mythic. Electroacoustic transformations allow us to look beyond what is easily accessible to the ear, and lead us 'inside' the sound, bringing out its inner intricacies as if through a microscope. Westerkamp analyses the natural patterns, listens to the inner music of the forest, searches for natural cycles in macroscale and the inner rhythms of individual sounds. She then reuses them musically to create a new image influenced by the broader context. By delving into the inner complexity of the sound and the outer complexity of its contexts, by bringing the environmental sound, patterns, and cycles to the forefront, she increases the audience's sonic awareness, guiding the listening and interpretation processes. By symbolically contrasting the ambience of the forest with the chainsaw, the piece makes the listener face ecological issues, as well as their emotions concerning the disappearance of the forests and its consequences. The ancient powers of nature – the eternal cycle of elements, life and energy – are disrupted and destroyed (perhaps forever) by human conquest and expansion.⁵² This juxtaposition is a powerful tool for expressing the ecological message. By using the raven leitmotif, the composer expands the metaphor and meaning further, including social relationships. The disappearance of the forest correlates with the disappearance of native cultures. Thus, *Beneath the Forest Floor* is not simply a depiction of the forest but rather a portrayal of the relationship with it of the individual, society, culture, myth, ecology, and history.⁵³

⁴⁷ Westerkamp, 'Notes on the Compositional Process', 50.

⁴⁸ Westerkamp, 'Notes on the Compositional Process'.

⁴⁹ Landy, 55.

⁵⁰ Landy, 57.

⁵¹ Landy, 49.

⁵² Westerkamp, 'Program Note Beneath the Forest Floor (1992)'.

⁵³ Landy, 56; Frédéric Duhaupas and Makis Solomos, 'Hildegard Westerkamp and the Ecology of Sound as Experience. Notes on Beneath the Forest Floor', *Soundscape. The Journal of Acoustic Ecology*, 13/1 (2013), 8.

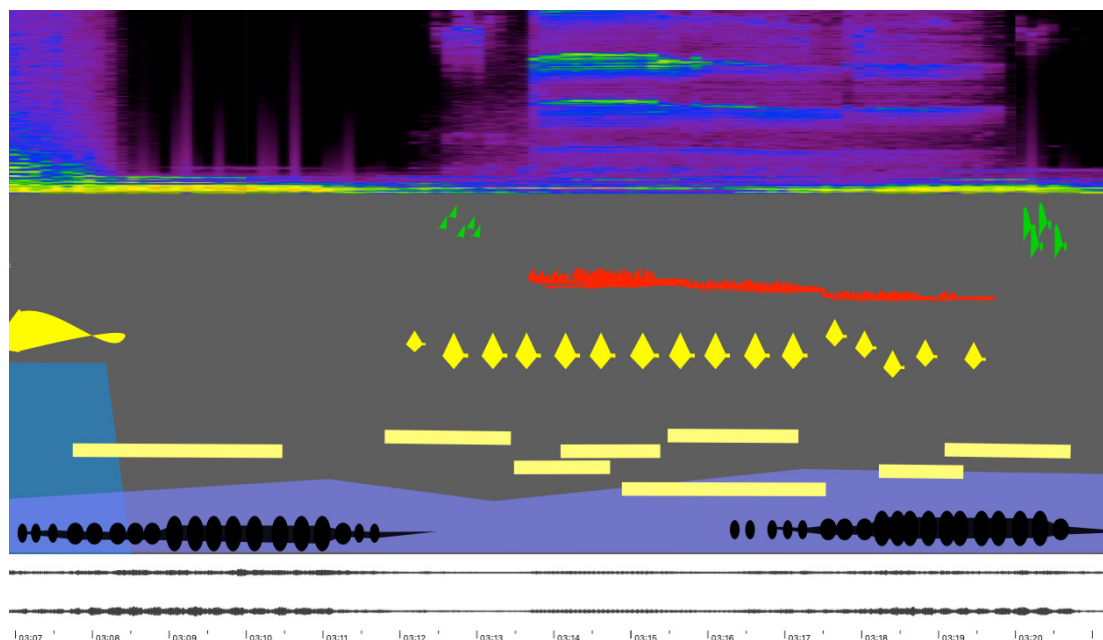


Figure 1. A frame from *Beneath the Forest Floor* graphic analysis by Małgorzata Heinrich.

GRAPHIC ANALYSIS

Due to the lack of scores, understanding and analysis of electroacoustic music are based on a keen listening experience. To illustrate the form, inner structures, and sound events, various types of visualisations can be used: calibrated spectrograms (linear or logarithmic), chromagrams, waveforms, or other less standardised graphics. Graphic analyses of electroacoustic music help understand the work's structure, focus on chosen parameters, and bring out the elements that might otherwise pass unnoticed: fine sounds, transformations, similarities and differences.⁵⁴ Visualisations can also become a communicational, educational, and mnemonic tool.⁵⁵ The focus on deep understanding of the piece, sound identification, and bringing out selected sound events makes graphic analysis close to the soundscape

philosophy and the ideals of soundscape composition. It serves as a guide for the ear and helps sharpen the sense of hearing. As an educational tool, it allows even an inexperienced listener to discern the sounds, their sources, the work's formal structure, the influence of changing sound types and ambience on the structure, etc. While some may argue that this approach again refocuses perception from auditory to visual (the problem was widely discussed by R. Murray Schafer himself⁵⁶), I believe that it is rather a case of reintegration of the senses to a natural continuum, symbolically rejoining the source (graphic representation) and the sound.

For a graphic analysis to be functional, one must adopt a proper method of grouping and representing the sound events. This may be based on four core approaches: 1) by sound source (causal analysis), 2) according to acoustic parameters of the sound (morphological analysis), 3) according to the sounds' function in the piece (functional analysis), and 4) according to structure (formal analysis), or a mix of all four,⁵⁷ as presented in this paper. The graphic representations can either be iconic (i.e. corresponding to the source/sound represented) or symbolic (where

⁵⁴ Pierre Couprie, 'Methods and Tools for Transcribing Electroacoustic Music', in *Proceedings of the 4th International Conference on Technologies for Music Notation and Representation (TENOR)*, Université Concordia (Montreal, 2018), 7–8; Pierre Couprie, 'EAnalysis: Developing a Sound-Based Music Analytical Tool', in Simon Emmerson and Leigh Landy, eds, *Expanding the Horizon of Electroacoustic Music Analysis* (Cambridge, 2016), 170–94.

⁵⁵ Couprie, 'Methods and Tools for Transcribing Electroacoustic Music', 8.

⁵⁶ See: Schafer, *The Soundscape*; Schafer, *The Music of the Environment*, 1.

⁵⁷ Couprie, 'Methods and Tools for Transcribing Electroacoustic Music', 8.

the relationship with the object is not literal). It is worth remembering that these two are not simple opposites; they rather create a continuum.⁵⁸ The analysis I propose uses both types of representations and their middle-ground forms. The graphics can correspond to the sound in various ways, which stem from multisensory experience, associations and cultural conventions through shape, width, vertical position, colour, texture, and animations. They may correlate with the sound on various levels, including its typology, causality, movement, morphology, granularity, frequency, etc.⁵⁹

The graphic analysis of *Beneath the Forest Floor* was prepared using iAnalyse 5, a program created by Pierre Couprie. I based it on causal, morphological and formal analysis of macro- and microstructures, using a linear spectrogram and waveform as a starting point. In the visualisation, I placed both iconic (e.g. chainsaw, waterdrops) and symbolic representations (shapes that correspond to the morphology and texture of the sound, or the layering of musical structures). The colours have been chosen arbitrarily, often based on associations (for example, blue as the colour of water or black symbolising very low and deep sound), typology (sounds from similar sources are drawn in the same/similar colours – e.g. orange for squirrels, red for ravens, blue for water), layering (figure-ground, the ambiance is semi-transparent, while sound events are bright), or sound processing techniques applied by the composer (reverb in transparent colours). The shape also corresponds to the sound based on the direction of the sound movement in stereo (arrows), morphology, and sound source. For example, the width of a given shape represents the spectral width and/or intensity, the length – its duration. The position of the shape in vertical space shows frequency correlation (usually in a relative, not an absolute manner, for the sake of legibility). The texture of the shapes corresponds to the granularity or pulsation of the sounds. The analysis is not animated since a static form better represents the structure and relations between sounds. It also allows the listener to anticipate events. For the sake of legibility, the analysis is partly reductional. It serves both as an analytical tool and guidance for listening.

Link to the graphic analysis video: <https://youtu.be/UaS34Rgce0A>

⁵⁸ Couprie, 'Methods and Tools for Transcribing Electroacoustic Music', 10.; Małgorzata Heinrich, 'Soundscape Composition jako gatunek muzyki elektroakustycznej – Teoria, analiza i znaczenie ekologiczne', master's thesis, Uniwersytet Warszawski, 2023, 77.

⁵⁹ Couprie, 'Methods and Tools for Transcribing Electroacoustic Music', 11.

CONCLUSION

Hildegard Westerkamp's *Beneath the Forest Floor* is a typical example of a soundscape composition with a high level of sound transformation and a variable perspective. While it does portray a real place, it also paints a much broader picture of ecological and social issues, while also reminiscing about the area of myths, legends, folk tales and other (cross-)cultural associations related to ancient forest.⁶⁰

I propose visualisation as an analytical and educational tool that assists in sound identification and in following the narrative of *Beneath the Forest Floor*. It helps sharpen the sense of hearing, sensitises it to the environmental sounds, and serves as a base for contemplating their symbolic meanings. I suggest that understanding sound associations (both personal and cultural) and exploring their network of meanings allows the artist and the listener alike to reacquaint themselves with their environment, culture, society, and self. The work is, therefore, a portrait of the relationship of the composer, the society, the culture (including native), animals, of humans as a natural species, as cultural beings, and as an industrial civilisation – with the forest, ideally inspiring ecological action.

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⁶⁰ Westerkamp, 'Program Note Beneath the Forest Floor (1992)'.

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