



# INTRODUCTION:

## ECOACOUSTIC ARTISTIC RESEARCH

- Ecological Sound Art // electroacoustic composition // multimedia installation
- Relationship between soundscape quality // biodiversity (urgent ecological issues)
- Measure & compare: presence of anthrophonies // biodiversity
- Present auditory and non-auditory patterns of a landscape
- A clear lack of effective communication of ecological findings to the public (Farina et al. 2017)
  - ▶ Artistic approach to process ecoacoustic findings in a sonic-visual artwork
  - ▶ Gain new perspectives on musical properties in composition inspired by ecological artistic research

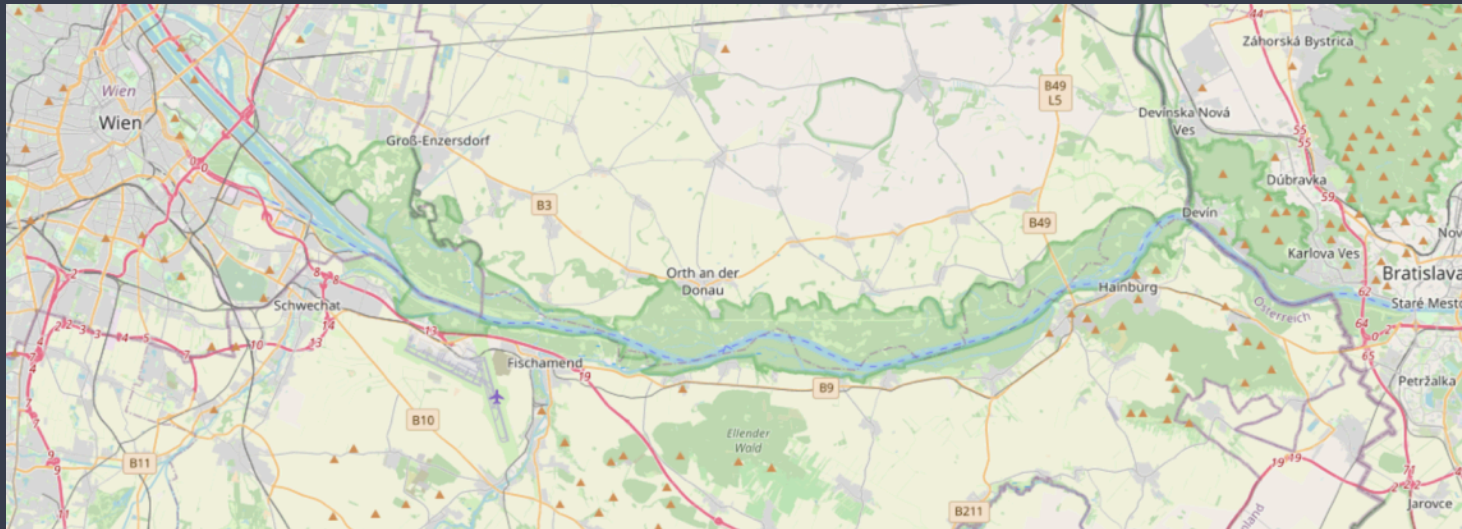


# RESEARCH QUESTIONS

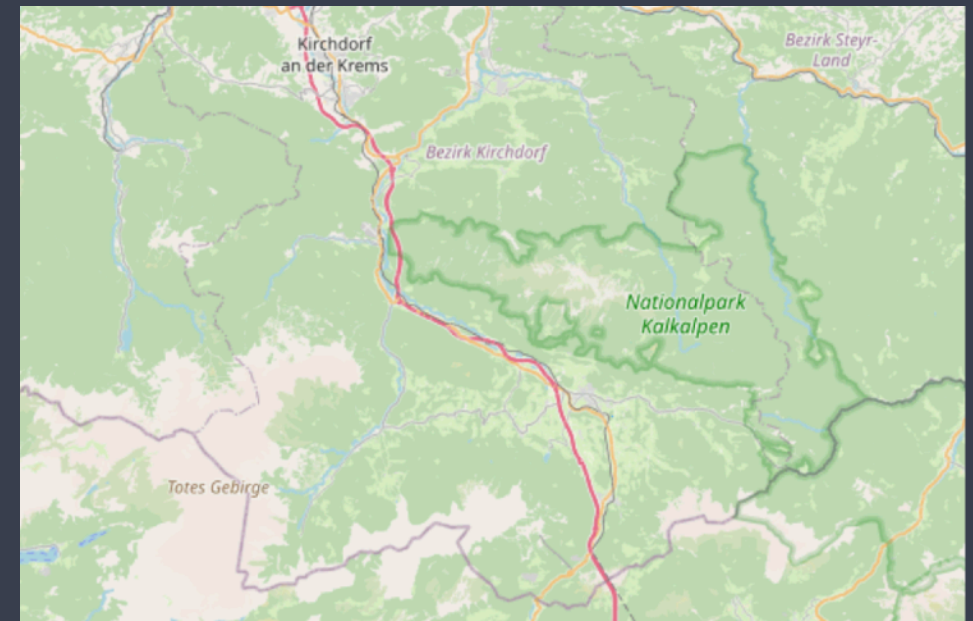
- How can sonic intermedia artwork raise awareness for ecological issues and ecoacoustic findings?
- How can artistic sonic intermedia represent the relation between soundscape quality, habitat ambiance and biodiversity?
- How can multichannel audio systems represent the spatio- and spectro-temporal dynamics of acoustic communities?
- How can sound recordings be used to capture ecological diversity (biodiversity, functional diversity, structural diversity) and anthropogenic influences on ecosystems?



# RESEARCH SITES



**Donau-Auen National Park**



**Kalkalpen National Park**

- Compare Natural with human-altered landscapes
- Representative habitats (flooded forest, Beech forest, etc.)
- 1 Year // 4 Seasons // 5 days // 24h continuously (May 2022 - April 2023)
- Assistances for ecological investigation:  
Dr. Jana Petermann and Master student Eyleen Engel BSc



# ECOLOGICAL DATA COLLECTION:

## Inclusion of the fauna/flora of selected groups of organisms:

- plants — species ID / estimation cover
- insects — traps / nets
- birds — visual / auditory recording
- amphibians — auditory recording
- mammals (incl. bats) — auditory recording

## Metadata:

- General informations: GPS coordinates, Temperature, Time, Humidity, Habitat structure, Light ( $\text{w/m}^2$ ; Lux), etc.

# ACOUSTIC DATA COLLECTION:

## LONG-TERM PASSIVE ACOUSTIC MONITORING (PAM)



© Wildlife Acoustics Song Meter Micro

- 2 devices simultaneously (Natural / human-altered landscape)
- 24h Continuous audio data for statistical analysis [Acoustic Indices]
- 24bit; 96 kHz

# ACOUSTIC DATA COLLECTION: ACOUSTIC SHORT-TERM SAMPLING (STS)



- First-Order Ambisonics (Monacchi 2017)
- M-S Stereo (Krause 2002)
- Sound Pressure Level (Farina 2014)
- Soil Recording - Hydrophone (Maeder 2019)
- Underwater Recording - Hydrophone (Krause 2002)
- Contact and Lavalier Recording (Krause 2002)
- Acoustic Bat Surveys - Bat detector/identifier (Wildlife Acoustics 2022)
- In situ Listening tests — Subjective Soundscape Assessment (Schaefer 1977, Oliveros 2005, Krause 2021)



## DATA ANALYSIS:

### ECOACOUSTIC AND SOUNDSCAPE ANALYSIS

- Acoustic Indices (ACI, ADI, BIO, NDSI, etc. )
- Ecological Indices (Evenness, Diversity, Functional Diversity)
- Visualisations (statistics, spectrogram, etc.)
- Manual and Automated Detection and Identification (Species Composition)
- Soundscape Analysis (Schaefer 1977)
- Soundscape Quality (Subjective Soundscape Assessments)
- Biodiversity Quality and Anthropogenic Presence

# DATA INTERPRETATION:

## ELECTROACOUSTIC COMPOSITION

- Interpretation and Sonification of Acoustic and Ecological Indices (Franinović et al. 2013)
- Soundscape Components and Soundscape Assessments
- Soundscape Interpretation as compositional guideline (Krause 2002)
- Spectromorphology and Spatiomorphology - Interpretation of Listening Experiences (Smalley 1997)
- Spatialisation for Acousmatic Reproduction Systems (Farina et al. 2017)

## DATA REPRODUCTION:

### ECOACOUSTIC COMPOSITION AND SOUND SCULPTURES

#### Case studies and Experiments

- Audio Papers and Radio Artworks (Groth et al.)
- Sonic intermedia Live Performances with Audience Research

#### Final Ecoacoustic Artworks

- Final compositions (physical release)
- Audio Papers (additionally to conference papers)
- Sound sculptures and Exhibit installations (National Park Centre)



# PRE-STUDIES:

## FIXED-MEDIA & RADIO ARTWORK

EcoSons Étude I - Möllerdall / De Biesbosch  
Soundscape Compositions

<https://dankwart.bandcamp.com/album/ecosons-tude-i>

EcoSons Étude II - wintershades

Ecological Radio Artwork [Radio Ara, Radia.FM]

<https://dankwart.bandcamp.com/album/ecosons-tude-ii>

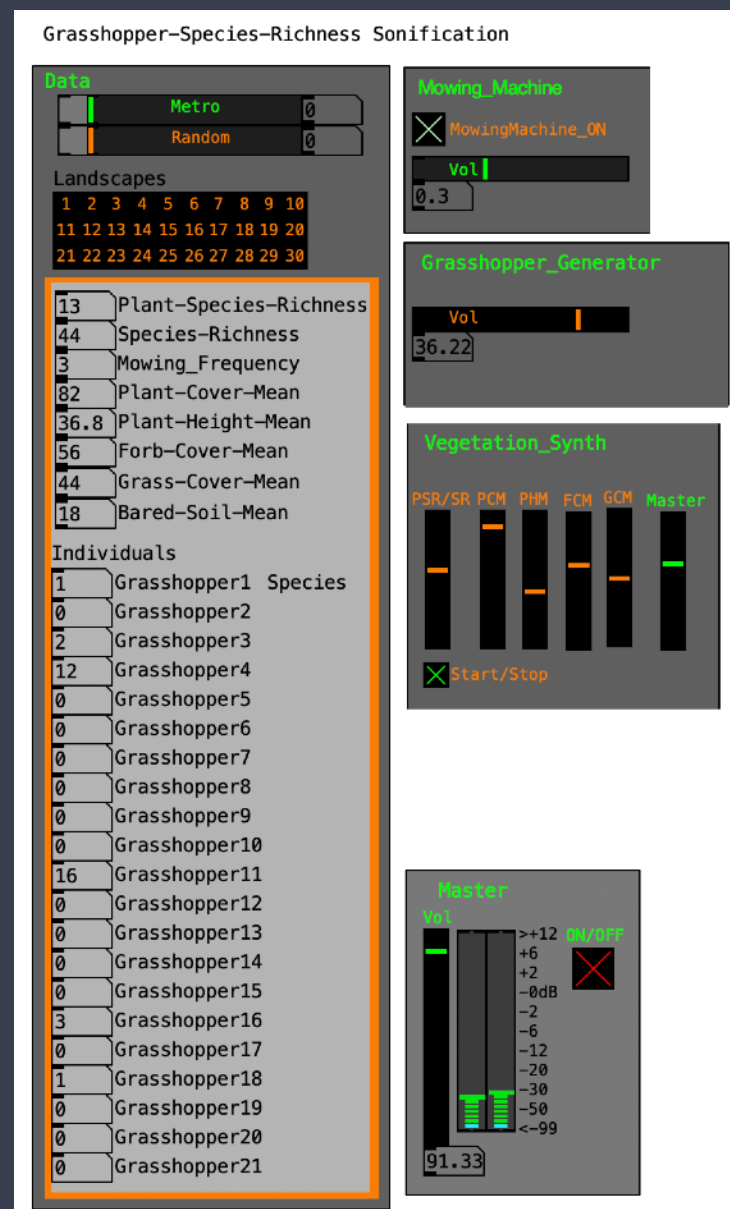
# PRE-STUDIES:

## SONIFICATION SYNTHESIZER

### Grasshoppers 1.1

Sonification of mowing impacts and grasshopper communities.

*Do grasshopper communities differ between extensively and intensively cultivated meadows? (mowing frequency, species richness, etc.)*



Preview of the Synthesizer

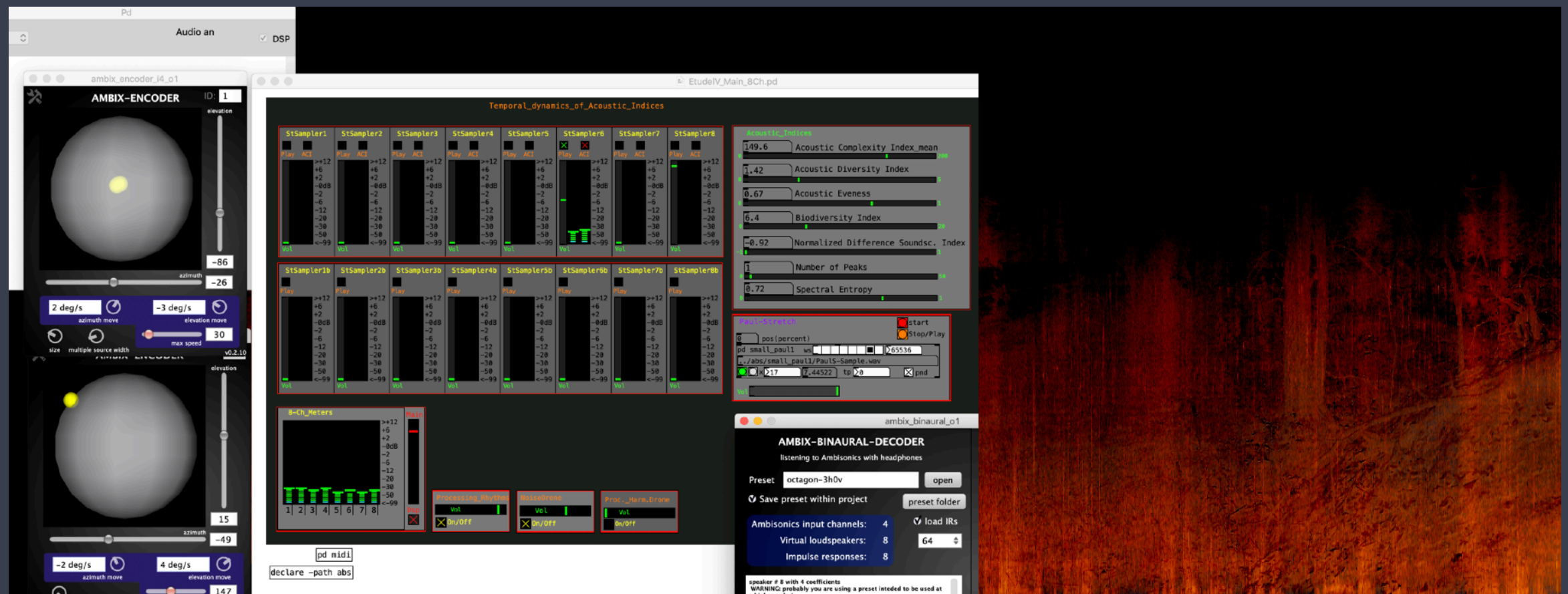
# PRE-STUDIES: LIVE PERFORMANCE

## EcoSons Étude III & IV

Sonification and Spatialisation of acoustic indices // audio-visual Live Performance

Earthday Festival 22.04.22 -15h — Online Concert

[earthdayartmodel.org/](http://earthdayartmodel.org/)





# IN COOPERATION WITH







*Thank you very much for  
your attention*