Developing acoustic monitoring of invertebrates: can current challenges be overcome?

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Acoustic surveys are now commonly used to monitor above ground terrestrial and aquatic taxa

This monitoring method has a range of benefits:

Non-invasive

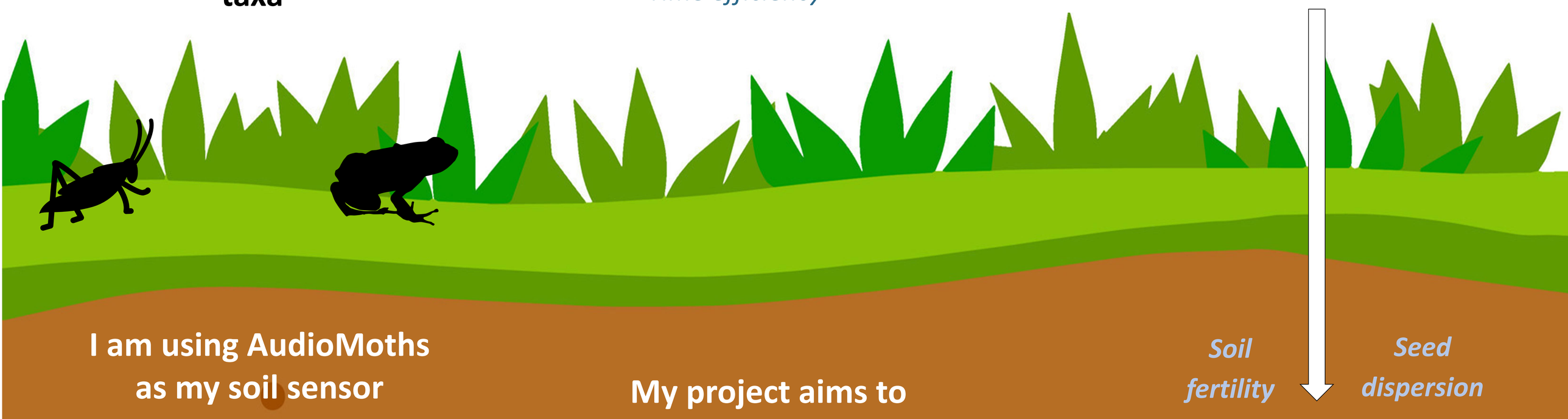
Provides continuous data

Reduces fieldwork costs

Time efficiency

However, there are relatively few acoustic studies *belowground…*

Soil is a considerably more difficult medium to monitor than air and water, owing to the affects of soil heterogeneity on sound propagation



I am using AudioMoths as my soil sensor

AudioMoths are low-cost (£60) compared to current sensors (£1000+). Currently only one study has tested these sensors belowground.

My project aims to develop acoustic sensors to map soil invertebrate diversity

Soil fertility ***Seed dispersion***

…despite the vast importance of soil invertebrates

Key ecological indicators

To begin with, I am doing a lot of experimental work owing to the challenges of soil acoustics:

Density ***Temperature*** ***Moisture***

Several parameters can impact the sound before it reaches the sensor

Obstructions ***Invertebrates*** ***Depth***

My experiments:

Depths

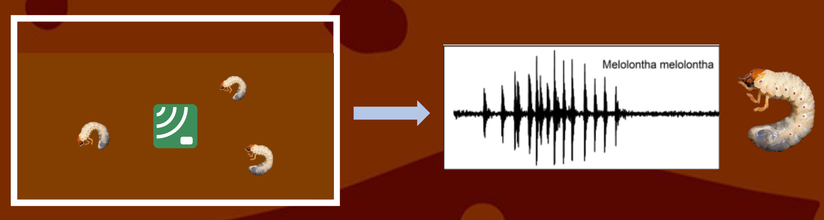
AudioMoth settings

Soil types

Attenuation

Invertebrate exclusion

I will isolate certain invertebrates, listen to them in the lab, and make a library of distinct sounds that each order/family/species make



Once I have established my methods, I will conduct fieldwork in Kenyan savanna habitats

Traditional fieldwork vs soil acoustic sensors

How soil invertebrates respond to disturbance (grazing, mammal exclusion etc.)

How soil invertebrates respond to restoration

@jonny_timperley @j.h.t_photography