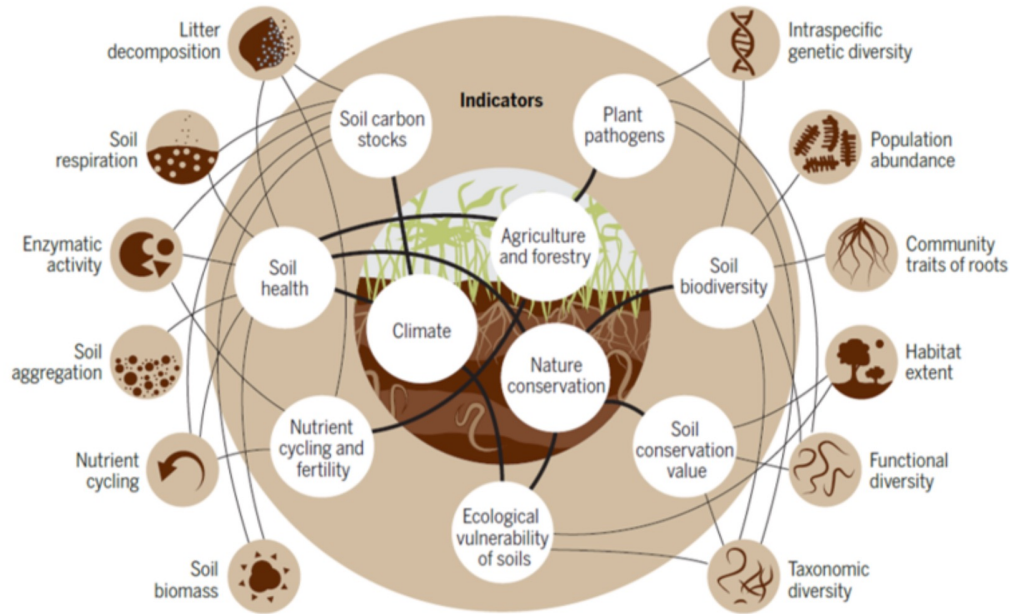


Soil BN

# THAILAND

**The Soil Biodiversity Observation Network (SoilBON) and the Ecology of Soil-borne Diseases in Loei, Nan and Kanchanaburi Provinces, Thailand**

# What is SoilBON?



SoilBON Essential Biodiversity Variables framework (Guerra et al., 2021).

The Soil Biodiversity Observation Network (SoilBON) is a global partnership that works with the Global Soil Biodiversity Initiative (GSBI), the Global Soil Laboratory Network (GLOSOLAN), and other global and regional partners.

Its objective is to make available the soil biological and ecosystem observations to better understand the soil biodiversity and functions, and to ensure that living soil resources are sustainably conserved and managed, and can support essential human needs.

Partners in Thailand  
+ SoilBON  
+ Universities  
+ DNP



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# Soil Biodiversity and Soil Functions

Nematode extraction,  
Soil Respiration Rate, Root traits,  
DNA extraction, Enzyme activity



Compare between conservation, plantation  
and agriculture areas

What are diseases linked with soil?

# Soil-borne diseases and Disease vectors in soil

DISEASE VECTORS IN SOIL

- **Leptospirosis** shares many epidemiological features with melioidosis. It is a zoonotic disease caused by pathogenic *Leptospira* species being shed mostly **by rodent reservoirs**, contamination occurs by contact with a contaminated environment (soil or water) more often than by direct contact with contaminated reservoirs.

- **Melioidosis** (*Burkholderia*) mainly affects those who are in regular contact with soil and water, e.g. farmers, with a higher risk during the rainy season.

- **Rodents** are carrying both pathogens and ectoparasite vectors (e.g., fleas, ticks, mites, and chiggers) of medical and veterinary importance. **Chiggers** – a larval stage of trombiculid mites – are an example of **soil-associated ectoparasite**, and the sole vector of *Orientia tsutsugamushi*, a rickettsial pathogen causing **scrub typhus**.



# OBJECTIVES

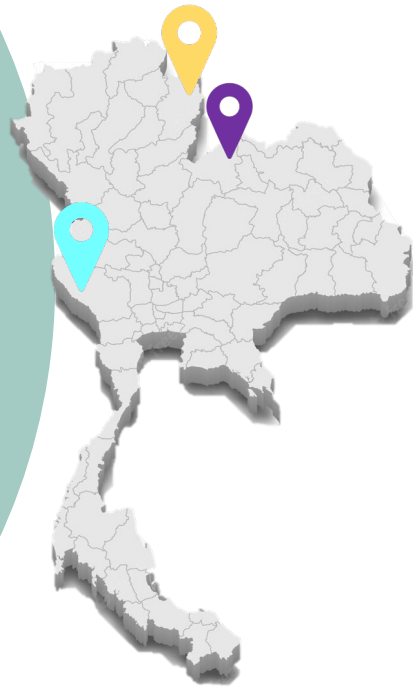
**Aim** - To better understand the relationships between soil biodiversity, soil ecology and soil-borne diseases.

## Specific Objectives:

1. To compare soil biodiversity and soil-borne pathogens between conservation areas, agricultural land and urban settings.
2. To identify influential factors for soil-borne diseases (pathogenic *Burkholderia spp.* and *Leptospira spp.*) transmission among hosts, pathogens, vectors and the environment in a disease ecology approach.
3. To determine the abundance and diversity of rodents (reservoirs of *Leptospira spp.* and other soil-borne pathogens) and their ectoparasites in the selected study sites.

# STUDY SITES

Conservation Area, Plantation area  
and Agriculture area



## Nan

Nanthaburi National Park and nearby communities



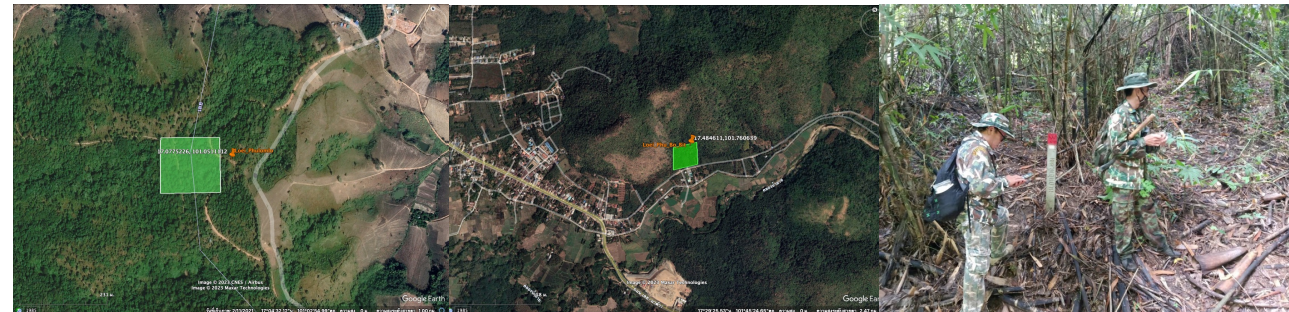
## Kanchanaburi

Erawan National Park and nearby communities



## Loei

Phuhinrongkha National Park  
Phubobit Park and nearby communities



# Sampling Strategy

## Livestock



- Swine, goat and cattle blood sampling

## Rodents

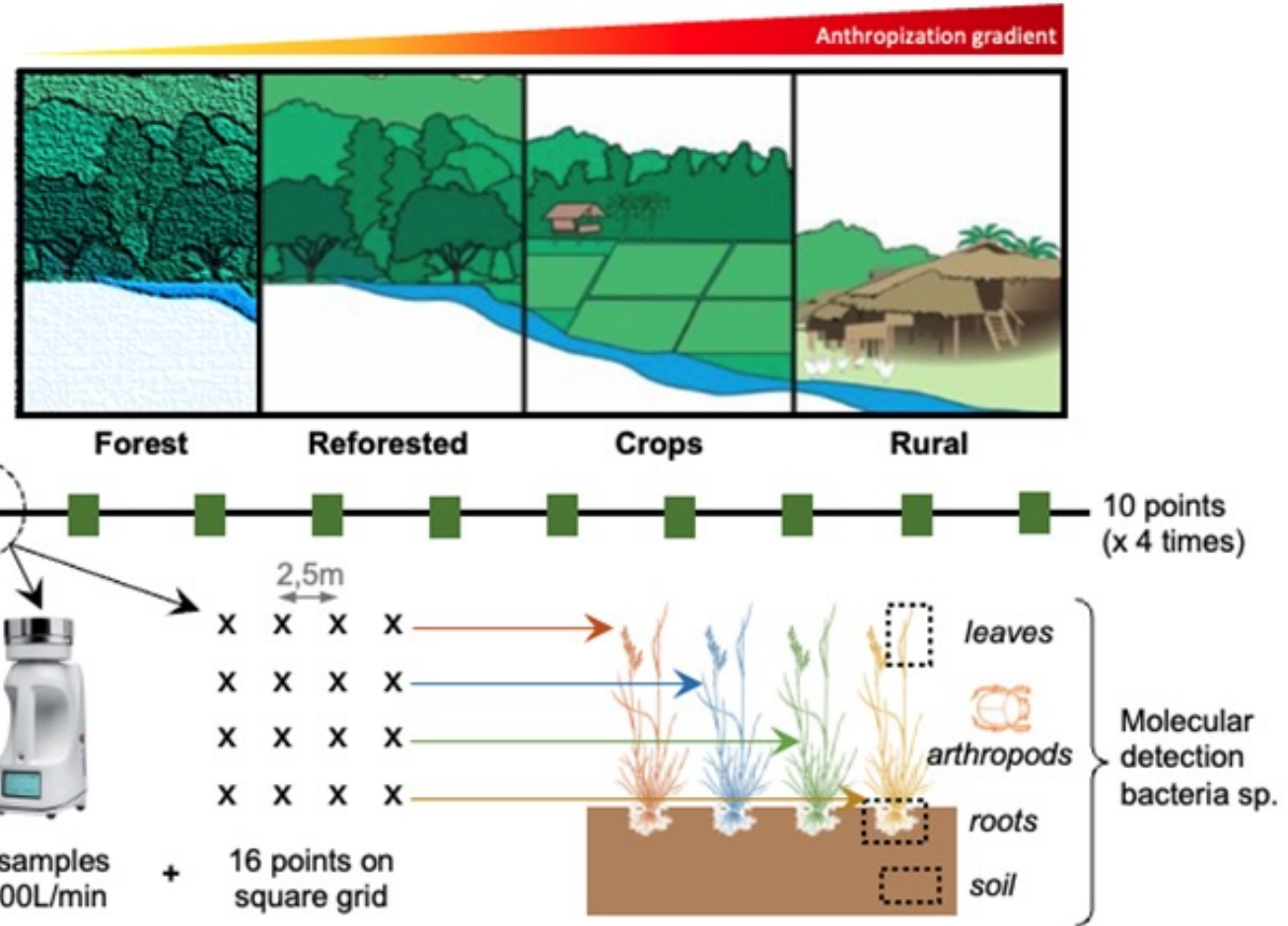


- Capture-mark-recapture to estimate population density in 36 points (6 x 6) square grids
- Samples: Blood, Fecal and Oral swabs

## Chiggers



- Black plating method to collect chiggers from soil in 36 points (6 x 6) square grids



Ecological data will be also collected at each sampling point (temperature, precipitation, land use, vegetation cover, water cover, slope, type of soil).



# Research Hypothesis

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Whether the **soil biodiversity** (e.g., microbiome, fungi, protozoa, worms, arthropods, etc.) through the trophic webs and different interactions among soil-dwelling species, **regulates** each other and the **pathogens populations and infection status**, avoiding disease outbreaks ???

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**Thank you for your attention**

## Example Scenarios

Increased soil moisture may both cause and be influenced by increased survival and activity of pathogenic micro-organisms within the soil.

Reduced soil moisture may increase transmission of some pathogens from soil by increasing the amount of dust available on which the pathogens may dispersed.