# CARBON FLUXES AND MICROBIAL COMMUNITY STRUCTURE IN DIFFERENT LAND USE TYPES AND CROPPING SYSTEMS IN MALAYSIA

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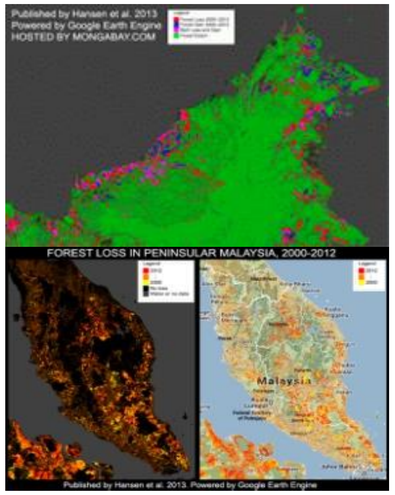
## MALAYSIA AND OIL PALM: SERVING THE NEED Vs SAVING THE NATURE

- Oldest consistent rainforests, rich in biodiversity and carbon content, and home for numerous endemic species, which are endangered
- Has the highest deforestation rate
- Agricultural expansion, especially oil palm monocultures is the biggest cause for deforestation, which also remains as the backbone of the country's economy
- Oil palm agriculture is a proven tool for economic development in the tropics Oil palm plantations are expected to increase all over the tropics
- All the previous surveys have shown that oil palm plantations adversely affect the vertebrate and invertebrate communities, but there is a minimal research done on soil microbes
- The effect of land conversion on microbial diversity & geochemical cycling is largely unknown




## OBJECTIVES

This research aims to address

- How land use change and agricultural expansion have altered microbial community structure and other soil properties
- The consequences of change in microbial community structure on geochemical cycles
- The understanding of relationship between MCS and geochemical cycles in different ecosystems

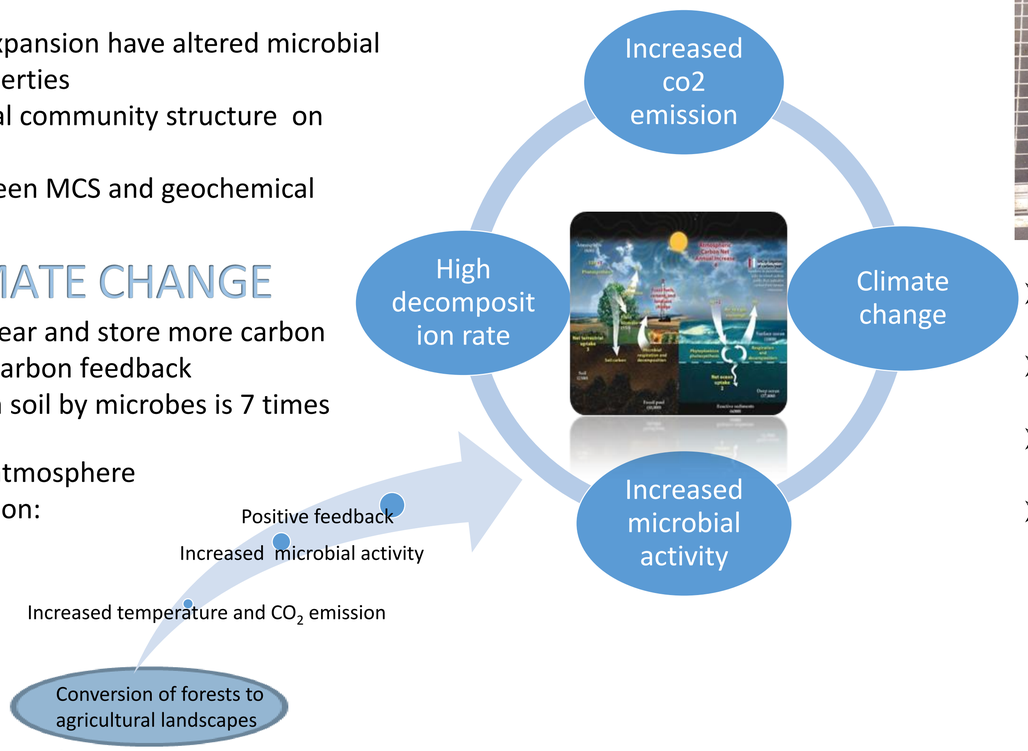
## TROPICAL SOILS AND CLIMATE CHANGE

- Tropical soils are active throughout the year and store more carbon than other soils. They play a major role in carbon feedback
- The natural process of $CO_2$ emission from soil by microbes is 7 times larger than anthropogenic emission

The soil contains 3times more C than the atmosphere

The persistence of carbon in soil depends on:

- Above ground biomass
- Climatic conditions
- Parent material of the soil
- Rainfall
- The soil itself
- Microbes present in the soil
- And all the interactions within and between them




The interactions within and between the microbes and other environmental conditions forms the central part of the carbon cycle. The understanding of the mechanisms of microbial interaction with geochemical cycles would be a new milestone in climate change research and would be immensely helpful in tackling climate change.

## METHODS

- Soil microbial Community structure , and the soil physical and chemical properties will be measured in different sites of the established gradient of disturbance, by Phospholipid Fatty Acid analysis (PLFA)
- The above and below ground carbon distribution will be measured in each sites
- The obtained data will be analyzed and used to explore the relationship between soil communities and carbon cycling
- The results will also give the effect of land conversion on the soil communities

## ONGOING WORK

- Oil palm along with commonly intercropped crops such as pineapple and macuna are grown in separate pots in a controlled growth room
- The crops are grown in both peat and mineral soils from Malaysia in different pots following Randomized Complete Block Design (RCBD)
- The phenotypic profile of the soil microbes is obtained before the plantation using Phospholipid Fatty acid analysis
- The soil is sampled every month to see the change in the microbial community structure over time with different plantations, which would give an initial picture of microbial community structure that comes with different plantations

## FUTURE WORK

The future work will be selecting sites for forest, first and second generation , young and old, oil palm monoculture and oil palm intercropping ,Measuring carbon flux and microbial diversity on all the selected sites of different gradient and explore the relationship between the soil microbial diversity and geochemical cycles