

# The effect of land-use of change in natural ecosystems in Zambia in relation to soil animal/microbial community

## (ザンビアの土壌動物および微生物群集に関する土地利用変化の影響)

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### 1. Introduction

In Zambia, small scale wetlands, where water is abundant in extensive period of the year, are called “Dambos”. These areas can potentially be used as agricultural lands and the significant part of the Dambos have been already cultivated. Few studies have performed so far to investigate the changes in the natural resources due to the cultivation of Dambos, particularly in relation to the soil ecosystems. Thus, more studies are necessary to investigate the natural resources in Dambos and their potential changes related to land use change. This research aimed to investigate the relationships among soil characteristics, soil insects and microbial community in different land use in Dambo area in Zambia.

### 2. Materials and Methods

The soil was collected from a partly developed lowland (wetland) farm in Central Zambia in February 2016. Soils from 12 sites were sampled from four different groups, namely, “native forest”, “grassland”, “watermelon” and “maize crops” (Fig. 1). Soil moisture, pH, inorganic-N and CN ratio of each soil sample were measured. Soil insects’ diversity was investigated at each sampling site using pitfall trap systems. In addition, soil DNA was extracted from each soil sample to investigate the relationships with other components.



Fig. 1. Photos of four land use types where the soils were studied. a; native forest b; grassland, c; watermelon field and d; maize field, Zambia

### 3. Results and Discussion

For the insect community, crickets and rove beetles were observed only in the maize sites. Earthworms, thrips, earth boring dung beetles and spiders were mostly existed in the forest and grassland sites. Some soil chemical properties, such as the CN ratio and soil moisture, had significant influences on the insect community. For soil microbes, bacterial groups such as *Bacilli* and *Gammaproteobacteria* were abundant in the native forest/maize sites. Previous studies reported that *Bacilli* was abundant in oligotrophic soils while *Gammaproteobacteria* prefer low pH and nitrate enriched soils. Thus, these abundance might be able to be considered as indicators for soil condition in this area.

### 4. Conclusion

This research compared soil chemical properties and insect/microbial communities in a partly cultivated wetland farm in Central Zambia. When four sites, forests, grasslands, watermelon farms and maize farms, were compared, the land use types influenced both insect/microbial community. More studies are needed to know to link these soil animal/microbial community data to soil fertility issues in all across Sub-Saharan Africa