氏　　　　　名		Yen Sin Foo （いぇん　しん　ふー）
所　　　　　属		都市環境科学研究科　都市環境科学専攻　観光科学域
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論 文 審 査 委 員	主査　　教　授	沼田　真也
	委員　　教　授	菊地　俊夫
	委員　　准教授	大澤　剛士

【論文の内容の要旨】

In response to massive biodiversity loss, the global extent of protected area had reached 14.7% in 2018 from 3.48 in 1985, with more than 202,000 terrestrial protected areas. Although, PAs had been widely promoted and used as a tourism hotspot worldwide, the central objective of PAs is to protect remaining habitat and species by reducing the rate of habitat loss and maintain species population level. However, the performance and efficacy of these PAs in conserving the nature are still poorly understood till today. More and more evidences showed that many PAs had failed in achieving their conservation goals in term of reducing or stop deforestation, and prevent population declined of threatened species due to unrestricted intense anthropogenic activities at the unprotected adjacent surrounding of PAs. These scenarios were observed mainly in the tropical and Southeast Asia region. As one of the megadiversity country, Malaysia had established numbers of PAs in form of national park, state park, wildlife reserve and wetland areas. Similar to other Southeast Asia countries, continual high rate of deforestation had occurred in response to agriculture development in the surrounding of the existing protected area which believe will affect the effectiveness of these PAs in conserving the nature. Nevertheless, research or documentation regarding the performance of these PAs were barely found. This study aimed to investigate to what extent the PA in Malaysia had performed by assessing the forest condition and species richness inside and outside the PA.

Out of the existing PAs in Malaysia, the Endau-Rompin National Park (ERNP) was selected as the assessment target due to its biodiversity richness, high degree of endemism, and a significant number of plant species that are locally endemic or restricted to the southern region of the peninsula are found in ERNP. The 3,721.45 km2 study area is located in southeastern Peninsular Malaysia, extending from 2°16'23.5"N to 2°50'18.5" N and 102°58'10.9"E to 103°30'23.2" E (Figure 2.1). The area includes the ERNP, a 10 km buffer zone extending from the ERNP's administrative boundary, and an extended area beyond the buffer zone.

Human caused land use land cover change had been identify as a major factor affecting the terrestrial ecosystem. In PAs effectiveness assessment, land use land cover change is one of the crosscutting indicators due to its high correlation with forest biodiversity such as species-specific habitat, carbon sequestration, and habitat connectivity or fragmentation. In this study, we intend to study focuses on theefficacy of PAs on forests inside and outside a national park, in terms of the quality and quantity of forests using multidate remote sensing data (Landsat). Finding reveals that ERNP was well protected in terms of deforestation and forest fragmentation, although the areas surrounding ERNP experienced significant decreases in forest cover and increases in forest fragmentation due to agricultural land expansion, especially oil palm plantation.

We also evaluated the environmental difference between the national park and its surroundings and assessed the environmental factors that affect the LULC changes pattern inside and outside the national park. The assessment showed that the environmental condition between ERNP and its surroundings are significantly different in term of elevation, slope, agroecology, distance from roads, and distance from town. Though the protection status of ERNP play a significant role in stopping deforestation, the other environmental factors like inaccessibility and unsuitability for agricultural activities of the ERNP appeared to be more important factors. The land use land cover change and deforestation trends in the surroundings were found strongly influenced by the accessibility to road and settlements primarily followed by agroclimatic index and elevation. The results indicated that the LULC changes occurred were mainly aimed for the expansion of commercial plantation, the oil palm.

To assesses the effectiveness of ERNP in ecological conservation, we performed a gap analysis using the potential terrestrial mammals as a target to examine if ERNP is located in places of important for biodiversity that are ecologically representative; and to what extend these mammals species need to be protected and are being protected by ERNP. Fortunately, the finding showed that ERNP is located at place that important for biodiversity that are ecologically representative. But all the evaluated mammals were

inadequately represented. The gap analysis finding also reveals that nearly all the remaining forest surrounding the ERNP that is high in species richness have to be protected in order to meet the minimum protection extend for the mammals in that regions and improve the ecological effectiveness of ERNP.

Crucially, the lower elevation forest habitat outside the ERNP are an important habitat to support the threatened mammal's species in ERNP. Unfortunately, the remaining forest land in the ERNP's surrounding are facing high risk to deforestation. The intense deforestation trends in the surrounding posed a great threat to the species conservation of the ERNP. In order to better conserve the mammal's population in the ERNP, restriction toward deforestation in the remaining forest in the ERNP's surroundings is suggested. Expansion of the existing ERNP's boundary and additional PAs are needed to improve the effectiveness of ERNP in term of mammal's conservation by increase the protection coverage for conservation hotspot.