

**ANALYSIS AND PREDICTION OF VEGETATION, CROPLANDS, AND  
URBANIZATION CHANGE IN THE PHILIPPINES  
USING DATA SATELLITE IMAGES  
BETWEEN 2001-2018**

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### Abstract

Urbanization in the Philippines is at a fast pace. As it grows, urban land expansion increases. It results in the conversion of land areas in the country. In determining its changes, this study used geographic information system images. Using data products of MODIS Terra and Aqua from NASA EOSDIS, it provides satellite images of the Philippines' cover and land use. Eighteen (18) satellite images were gathered and used in this study. The findings showed that the NCR and Cebu islands regions are the most urbanized areas in the country.

The descriptive statistics revealed that both urbanization and vegetation cover increase while the cropland cover gradually declines. Multiple linear regression analysis revealed that these variables are significant to each other. It also revealed a positive relationship between urbanization and vegetation, while both showed a negative relationship to cropland cover. For the next five (5) years, the data showed that urbanization will increase immensely and expand to 3181.45235126086 km<sup>2</sup> in 2023. This study also revealed a slow growth in the country's vegetation cover. By 2023, there is an expected growth that will reach 218241.313924067 km<sup>2</sup> total areas. Thus, the continuous expansion of urbanization and vegetation revealed that there will be a loss in cropland cover and will only have 40215.3680450109 km<sup>2</sup> total areas in 2023. It was also predicted that by 2131 there would be a total loss in the cropland area of the Philippines.

## **CHAPTER I**

### **THE PROBLEM AND ITS BACKGROUND**

This chapter implied the background of the study and determined the answers for the problems that the researchers were looking. This chapter discussed the focus of the study, which is the vegetation, cropland, and urbanization change that occurred in the Philippines. This chapter presented the hypothesis about the correlation between vegetation, croplands, and urbanization of the Philippines throughout the year.

#### **Introduction**

Urbanization is a process in which a specific location has a physical growth of rural or natural land into urban settings (Kuddus et al., 2020). Urbanization growth widely affects the affected area's ecological, environmental, and economic status (Wu 2006). Ecological and environmental status can relate to the number of vegetated areas (Pei et al., 2018), while economic status can be related to the number of cropland areas (Viet Nguyen, & Ngoc Tran, 2013), as cropland is responsible for the production of food and not to mention, the labor and workers should be considered production of goods and food also counts as the factor that affects the rate of economic status. Even though urbanization affects the cropland and the vegetation, the cropland and vegetation also affect each other. People living in urbanized areas are more likely to consume more goods, including food, production of goods, and the



consumption of energy. This consumption pattern affects the environment that pollutes the area, and green areas are more likely to be used to convert urbanized settings. During the first half of the twentieth century, urbanization has been increasing (Chadchan and Shankar, 2009).

In East Asia and the Pacific, the Philippines is one of the most rapidly urbanizing countries. Over the last five decades, the urban population has increased by more than 50 million people. By 2050, cities will be home to nearly 102 million people, more than 65% of the country's total population. Overall, urban density is high, particularly in Metro Manila as one of the region's fastest-growing megacities. From 2000 to 2010, the Philippines' urban population grew faster than its East Asian counterparts. The average annual growth in population in the Philippines was 3.3%, compared to the regional average of 3.0% for 21 urban areas with at least 100,000 inhabitants reported in the Philippines. The average annual growth in population in urban areas was even higher at 3.9%, excluding Metro Manila (Baker, 2017).

This significant rate of urban growth affects the numbers of cropland and vegetation. The increase of urban population will eventually lead to urbanization. Thus, urbanization affects vegetation and cropland. It is due to urbanization being associated with forest loss due to both sources of raw materials for the construction and the replacement for residential expansion as a source of land (Butler, 2020). During urbanization, a significant ecological disturbance occurs, habitat loss and land degradation arise, which cause of altering on healthy biodiversity, a more significant rate of urbanization might lead to mass loss of natural resources since raw materials

are needed in constructing new infrastructure and not mention that developing urbanization also increases the urban population, this will lead to increase of demand in natural resources and usage of it to their daily needs. The global urban populations are expected to increase by 1.4 billion by 2030, accounting for 60% of the sum of global population to reach 2.6 billion people from all cities and towns (USAID, 2013). The greater the population, the more significant the land use allocated for urbanization.

The Philippines' vegetation is highly diverse and