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ABOVE-GROUND BIOMASS ESTIMATION FOR URBAN MANAGEMENT USING REMOTE SENSING

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ABSTRACT

Deforestation has been a notable and common threat to the world and it is generally due to the rapid development of commercial, residential and industrial area. This rapid urbanization accompanied with excessive release of carbon dioxide (CO_2) from transportation, manufacturing plant and domestic establishment are also the main reasons to cause climate change in an urban environment. One way to fix these issues is through the planting of urban forest as it is able to help in achieving low carbon city. Therefore, quantifying the above-ground biomass inside an urban area can help in understanding and visualize the condition of the above-ground biomass and carbon storage. Remote sensing technology is one of many technologies that are capable in monitoring and quantifying the above-ground biomass in a large and small scale area with less man-power and time consume and also cost efficient. This study aims to quantify the changes of landcover and the above-ground biomass that occur in Bandar Meru Raya, Ipoh from 1995 to 2005 and from 2005 to 2015 using Landsat 5 and Landsat 8 images. Landcover changes was quantified using supervised classification (maximum likelihood) and the above-ground biomass was estimated using two methods which are through the model equation development using Pearson's correlation analysis from image variables and field data for the oil palm area and using the normalized difference vegetation index (NDVI) to calculate the carbon storage for the urban forest. Results shows that, within two decades, the forest has lost its area by a total of 183.12 hectares and this is in line with the above-ground biomass content changes where there is a total loss of 15,706.045 tonne of above-ground biomass. Hence, these results can enable authorities to take action in managing the urban forest in order to maintain a stable climate and achieving the low carbon city status.

ACKNOWLEDGEMENT

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CHAPTER ONE
INTRODUCTION

1.1   Research Background

According to Worldwide Fund for Nature (WWF) (2014), the earth is overgrown by forest by 30% and a myriad of living things can be found in it. Forest also offers a wide range of essential goods such as wood, timber, remedies and coal (Mohd Zaki & Abdul Latif, 2016). In addition, forest also plays important roles in stabilizing the global climate and carbon cycle (Günlü *et al*., 2014). However, due to various human activities, natural disaster, climate change, that affect the forest resources (Xu *et al*., 2021)it has also caused the earth's climate quality to dwindle (Aricak *et al*., 2015) thus, leading to various environmental issues. Since urbanization is rapidly growing, it has become a serious contributor to the global environmental change, which may dramatically alter regional patterns of carbon cycle (Pataki *et al*., 2006). However, there are numerous measures that have been introduced to counter the issue of carbon emission in cities such as green environment, green economy and green community (Siong *et al*., 2013). In this instance, all of these measures have been considered to have direct contribution towards reducing the effect of carbon emission. In line with this, urban trees play important roles as the other factors that contribute to low carbon cities. Among the help that urban trees provide are storing and sequestrating the undue carbon dioxide (CO_2). In order to observe the carbon, it can be done through observing the biomass of trees. It is vital as it will help in assessing ecosystem response to climate change (Ni-Meister *et al*., 2010). Biomass can be divided into two parts which are above-ground biomass (AGB) (stem, leaves, branches and any parts of trees that are located above the ground) and below ground biomass (living roots) (D. Lu *et al*., 2014). Many studies on biomass estimation are focused on the above-ground biomass because it holds most of the biomass in the forest ecosystem (Aricak *et al*., 2015; Chave *et al*., 2014; Shen *et al*., 2020; Wilkes *et al*., 2018).

Malaysia is one of many countries that are a fast developing nation. This can be seen through the construction statistic where in the third quarter (Q3) of 2014, there

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