

Land use/cover change and landscape fragmentation analysis in Baguio: A hill station city in the Philippines

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Land is a very important resource and its use or cover depends/and or changes on a given underlying purpose. Land use/cover (LUC) change, however, is a complex process influenced by the interrelated components of the natural and socio-economic systems. It has been part of the current global environmental issues. In a much smaller scale, LUC change can also influence the fragmentation of a particular landscape that often results to the loss of aesthetic values of the landscape. For these reasons and due to the negative consequences of uncontrolled population growth and urban expansions, environmental protection and conservation for the benefits of human beings of the current and future generation becomes a vital component of modern land use planning.

The objective of this study is to analyze the LUC changes and landscape fragmentation in Baguio, a hill station city and the summer capital of the Philippines. It also aims to capture the factors encouraging its urbanization. Remote sensing data were used to derive the 1988, 1998 and 2009 LUC maps for Baguio containing four classes, namely built-up, forest, brushland and cropland, while GIS techniques were used to detect the LUC changes and patterns. The fragmentation of the landscape of Baguio for the three time periods was analyzed using the landscape metrics at class level, namely number of patches, patch density, largest patch index, mean patch area, landscape shape index, and interspersion and juxtaposition index. Socio-economic survey was conducted to capture the perceptions of people on the factors that encourage the urbanization of Baguio. The respondents were grouped into non-residents, residents and employees of concerned agencies like office of the city planning and development, national economic and development authority, department of environment and natural resources, housing and land use regulatory board, among others.

Results revealed that built-up area almost had a 3-fold increase during the study period (with an area of 1,076 ha in 1988, 1,973 ha in 1998 and 2,985 ha in 2009) at the expense of the other land uses/covers. Results of the fragmentation analysis revealed that built-up class became more aggregated and clumped indicating an in-fill pattern of urban development. However, forest class became more fragmented, while brushland and cropland classes show complexity in their changes. Results of the socio-economic survey showed that among the top five factors encouraging the urbanization of Baguio that are common to all the groups of respondents include population growth, presence of economic opportunities, presence of schools and universities, land use plan/policy, and favorable cool climate.

The results showed that the transformation of the landscape of Baguio was greatly influenced by its urbanization as indicated by the significant increase in its built-up area resulting to a substantial decrease and more fragmented green spaces, which are vital components in its status as the summer capital of the country. The city must rise to the challenge to address the problems of rapid population growth and urban expansions in the name of modernization and sustainability, taking into consideration the significant roles that Baguio city plays, and its potential. The city government and its constituents must work in unison in drawing up responsive development plans, with emphasis on the conservation of the natural environment in tandem with sustainable economic development.

Keywords: Land use/cover, Landscape fragmentation, GIS, Remote sensing, Baguio, Hill station