

Land use/ cover change by human impacts using time series of geographic information

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The study aims to analyze human impacts on land use/ cover change using enriched time series geographical datasets. Two study areas are selected. The one is Tsukuba City and the other is Miura Peninsula. Both areas have experienced big land use/ cover changes by construction of rail system.

In Tsukuba City, land use changed area located along the Tsukuba Express (TX) railroad line, which was opened in 2005, were analyzed using the annual time series of land use data from 2000 to 2009. The land use changed area after 2003 is large, because of rapid developments just before the opening of TX railroad. About the contents of land use changes in the buffer nearby railroad line and station, development ground is dominant for land use after change between 2003 and 2004 and before change between 2008 and 2009, and various land uses such as residential area, commercial area and road area are dominant for land use after change between 2008 and 2009. On the other hand, the peak of land use changes area is after 2008 about the buffer far from railroad line and station. The change between 2008 and 2009 can read the tendency that rate of developing ground after change being larger than the buffer near railroad line and station.

Frequency of land use change is analyzed to clarify the geographical condition of the land use change. We found that approximately 30 percent of the study area changed the land use for the study period. The maximum frequency of land use change is six times in each land use polygon during the study period. As a result, when the frequency of land use change is low, the adjacent polygons have low frequency of land use change. At the same time, when the frequency of land use change is high, the adjacent polygons have high frequency of land use change. Those indicate that the polygon with frequent changes of land use is located in an area of frequently changed land use. Additionally, those suggest the existence of a place which can change the land use easily.

In Miura Peninsula, the railroad opened in the Meiji period. We compared the vegetation data in early Meiji period produced using "Jinsoku-sokuzu" map and the actual vegetation map data in 2000 published by the Ministry of Environment. Although scrub forest decreased conspicuously in whole Miura Peninsula, secondary forest and natural forest were left behind 20% even in 2000. The area ratio of scrub forest, secondary forest and natural forest decreased remarkably in Tokyo Bay side, especially decreasing from about 50% to about 10% at the northern Yokosuka basin. At Zushi coast basin and Odawa bay basin on Sagami Bay side, the area ratio of secondary forest and natural forest in 2000 remains in about 35-40% from the early Meiji period. The unified secondary forest and natural forest are left at Morito River origin area in Zushi coast basin and Koajiro Bay coast in Miura City south basin in the 2000s. The difference of the human impact such as existence of railroads can also regard the big difference between Tokyo Bay side and Sagami Bay side as one of factors.

Keywords: time series of geographic information, human impact, land use change, Tsukuba City, Tsukuba Express, Miura Peninsula