

Change prediction of forestland area by transition of land use type in future of South Korea

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Since 1970s, South Korea has been developed rapidly in economic and industrial parts during 40 years by Economic Development Plans led by Korean government. Consequently, urbanization has been accelerated and population then started to be flowed into major cities. In result, many parts of forestland and agricultural land in South Korea have been changed into urban area by urban expansion and population migration. Such transition direction is very important in terms of land use management and future strategy establishment of national scale. Therefore, the transitional interaction between land use types in future of South Korea was predicted in this study using econometrical and geographical models based on past trend data of land use type and related variables. The econometrical model based on maximum discounted profits theory for land use type determination was used to estimate total quantitative change by forestland, agricultural land and urban area at national scale using explanatory variables such as forestry value added, agricultural income and population during over 46 years. In result, it was analysed that forestland area would decrease continuously at approximately 29,000 ha by 2027 while urban area increases in South Korea. However, it was predicted that the forestland area would be started to increase gradually at 170,000 ha by 2050 because urban area was reduced according to population decrement from 2032 in South Korea. As next step, the geographical model was developed by logistic regression analysis to predict where such mutual quantitative changes by three land use types is spatially distributed, using independent variables such as elevation, slope, slope permission standards by local government, official land price, population and distances from highway interchange, general road, railway station, railroad line and subway line. In result, rank-order maps based on change probability of a target land use type to other land use types was prepared to raster dataset at spatial resolution of 30m×30m. And then total quantitative change by a target land use type to others estimated through the econometrical model was allocated, in accordance with the rank orders of cells, to land use change types which are forestland to agricultural land, forestland to urban area, agricultural land to forestland, agricultural land to urban area, urban area to forestland and urban area to agricultural land. When the spatial change pattern of forestland and urban area by 2050 was shown, we could find out that the decrement of forestland would occur mainly near major cities by 2027 and that the increment of forestland would be started near local provincial cities by 2050 due to localities extinction by steep decrement of population from 2032. The decrement and increment of forestland by unbalanced population immigration to major cities and migration to localities might cause many social and economic problems against national sustainable development, so that future strategies and policies should be established considering such future change trends of land use type for balanced development and reasonable forestland use and conservation.