

Environmental Consequences of Population Concentration in Mega-City Tokyo

Topic: Environmental Input-Output Modelling (5)

Author: KAIRI INOUE

Co-Authors: Shigemi KAGAWA, Sho Uehara

The concentration in Tokyo refers to the phenomenon that population, industry, and economic activities are excessively concentrated in Tokyo, the capital city in Japan, and its surrounding areas. While the total population of Japan is decreasing, the population of Tokyo is increasing. According to government projections, the population of Tokyo is expected to continue to increase. Therefore, it is anticipated that the population imbalance toward urban cities will continue to accelerate.

If the concentration of people in Tokyo and other metropolitan areas becomes more severe, serious issues may arise, such as the intensification of the urban heat island effect, leading to higher temperatures in city centers, worsening air pollution, and increased CO₂ emissions triggered by excessive electricity consumption and high final demand of goods and services. In response, the Tokyo government has set a goal to achieve a carbon-neutral society by 2050. Therefore, mitigating the over-

concentration of population and resources in Tokyo is a critical issue. To address this, the Japanese government has introduced various policies aimed at reducing population concentration in Tokyo. As a representative the Cabinet Office of Japan Announced “Digital Garden City Nation Initiative”, aiming to achieve a net annual population outflow of 10,000 people from the Tokyo metropolitan area to regional areas by 2027.

The purpose of this study is to analyze the environmental impacts of mitigating population concentration in Tokyo. We use input-output table of Tokyo Prefecture in 2015 and migration flow data for each prefecture in Japan. Firstly, to identify the factors contributing to population growth in Tokyo, we conducted a multiple regression analysis. We use migration flows data between Tokyo and other prefectures as the dependent variable and included population density, per capita prefectural income, and employment ratios across primary, secondary, and tertiary industries as the independent variables.

Based on the migration inflows to Tokyo estimated through multiple regression analysis, we projected population changes in Tokyo and its surrounding areas under relevant economic scenarios. We then determined the final demand required for these population changes in Tokyo. Additionally, using environmentally-extended input-output analysis, we evaluated the environmental impacts of migration-induced changes in final demand for Tokyo, quantifying the consumption-based CO₂ emission reduction potential associated with the government’s policies to mitigate population and resource concentration in Tokyo.

The results indicate that a higher proportion of the population engaged in primary industries and higher per capita prefectural income significantly influence migration flows in each prefecture. The findings also suggest that an additional increase of 94,000 JPY in per capita annual prefectural income across 46 prefectures is required to achieve a net annual outflow of 10,000 people from Tokyo.

Furthermore, we estimated the potential CO₂ emission reductions in Tokyo resulting from the mitigation of population and resource concentration. The CO₂ reduction potential associated with a net outflow of 10,000 people from Tokyo is estimated at 48 kt-CO₂, with significant contributions from the electricity, food, telecommunications, and transportation sectors. Based on these findings, we propose effective policies to mitigate over-concentration in Tokyo and promote a sustainable urban lifestyle, focusing on the key sectors identified in this study.