

Carbon Footprint Assessment and Application in Urban Planning and Geography

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Abstract : Human life, activity, and culture depend on the wider environment. Cities offer economic opportunities for goods and services, but cannot exist in environments without food, energy, and water supply. Technological innovation in energy supply and transport speeds up the expansion of urban areas and the physical separation from agricultural land. As a result, division of urban agricultural areas causes more energy demand for food and goods transport between the regions. As the energy resources are leaking all over the world, the impact on the environment crossing the boundaries of cities is also growing. While advances in energy and other technologies can reduce the environmental impact of consumption, there is still a gap between energy supply and demand by current technology, even in technically advanced countries. Therefore, reducing energy demand is more realistic than relying solely on the development of technology for sustainable development. The purpose of this study is to introduce the application of carbon footprint assessment in fields of urban planning and geography. In urban studies, carbon footprint has been assessed at different geographical scales, such as nation, city, region, household, and individual. Carbon footprint assessment for a nation and a city is available by using national or city level statistics of energy consumption categories. By means of carbon footprint calculation, it is possible to compare the ecological capacity and deficit among nations and cities. Carbon footprint also offers great insight on the geographical distribution of carbon intensity at a regional level in the agricultural field. The study shows the background of carbon footprint applications in urban planning and geography by case studies such as figuring out sustainable land-use measures in urban planning and geography. For micro level, footprint quiz or survey can be adapted to measure household and individual carbon footprint. For example, first case study collected carbon footprint data from the survey measuring home energy use and travel behavior of 2,064 households in eight cities in Gyeonggi-do, Korea. Second case study analyzed the effects of the net and gross population densities on carbon footprint of residents at an intra-urban scale in the capital city of Seoul, Korea. In this study, the individual carbon footprint of residents was calculated by converting the carbon intensities of home and travel fossil fuel use of respondents to the unit of metric ton of carbon dioxide (tCO₂) by multiplying the conversion factors equivalent to the carbon intensities of each energy source, such as electricity, natural gas, and gasoline. Carbon footprint is an important concept not only for reducing climate change but also for sustainable development. As seen in case studies carbon footprint may be measured and applied in various spatial units, including but not limited to countries and regions. These examples may provide new perspectives on carbon footprint application in planning and geography. In addition, additional concerns for consumption of food, goods, and services can be included in carbon footprint calculation in the area of urban planning and geography.

Keywords : carbon footprint, case study, geography, urban planning

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