

## Spatial typology in informal urban green spaces: The case of Ichikawa city, Japan

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Today, more than half of the world's population lives in urban areas, and there is a large body of research on urban green spaces where one can experience nature directly and indirectly. Studies have found that properly established, designed, and managed urban green spaces such as urban parks, second growth, etc., provide not only social, environmental, and economic benefits for cities, but also mental, physical, and physiological benefits for human beings. These studies, however, focused on formal urban green spaces such as urban parks and second growth, which are managed by governments. In order to improve people's quality of life, governments have tried to make and manage green spaces, but encountered financial and spatial challenges. Even if the volume of green spaces in urban areas is quantitatively met, will it actually be sufficient in terms of availability? Given the current circumstances of urban green spaces, this research responds to the situation by addressing the following questions: (a) What criteria can be categorized between formal urban and informal urban green spaces? (b) How much informal green space (IGS) is distributed in one city? (c) Can IGS be viewed as a new type of green space in urban areas? (d) And how is the spatial distribution of IGS related to population density and land use? Green spaces in urban areas have become more important; however, most studies in this area have focused on public or mass green spaces such as urban parks, second growth, etc. However, in terms of existing park management systems, it costs a lot to maintain these spaces, and they may fail to satisfy residents' varied needs. Comparatively less research has focused on IGS or minor green spaces; actually, little outside of major green spaces has been considered. Some scholars have begun to study urban wild-scapes or ambiguous landscapes to determine their potential in urban areas. Rupprecht and Byrne (2014) argued that IGS such as vacant lots, brownfields, and street or railway verges comprise part of this urban nature. They noted that IGS is an emerging topic in urban greening research; however, IGS can also be vulnerable to being contested politically, legally, and aesthetically. Rupprecht and Byrne identified nine potentially different types of IGS: street verge, lot, gap, railway, brownfield, waterside, structural, microsite, and power line IGS. IGS can also be called ambiguous, in-between, liminal, and ambivalent vegetated spaces.

Ichikawa city is located in northwestern Chiba Prefecture, Japan. The city has an estimated 481,790 people (as of February 2016) and a 5,745ha area. Facility green spaces including urban parks, public facilities, and private facilities in the city make up 382ha. The volume of urban parks per person is 2.70m<sup>2</sup>. This is not sufficient under the Urban Park Act of Japan. The Act states that the standard volume of urban parks per person is 10m<sup>2</sup>. The volume of all of the green spaces in Ichikawa per person, even though these green spaces include public facilities, is just 7.28m<sup>2</sup>. This means that there are not enough actually usable green spaces.

Vacant lots make up much of Ichikawa city's IGS. IGS in Ichikawa city can be classified by accessibility, soil conditions, and vegetation structure. Some IGS are accessible, while others are not. Some IGS may fulfill a role in the urban ecology, in which they can provide habitat for flora and fauna such as biotopes, and other IGS may serve urban society by providing recreational spots for residents. In present Ichikawa city, the volume of parks and green spaces per person is low compared to surrounding cities. The volume of parks per person in Ichikawa is 2.70m<sup>2</sup>, which is lower than the Urban Park Act of Japan stipulates (10m<sup>2</sup>). Potential green spaces such as IGS can be functional places instead of urban parks, affecting not only residents' health but also providing habitat for flora and fauna. The following research can conduct an

analysis on the land use patterns, population density proportion, and perspectives of residents, because there are diverse types of land use pattern in Ichikawa city and the perceptions or preferences of residents may differ depending on these patterns.

Keywords: Typology green space, Informal urban green space, Urban wildscape, Vegetation