

# Green Infrastructure in Métropole du Grand Paris

## 1. Background

Green Infrastructure (GI) refers to the network of natural and semi-natural areas that provide eco-system services and preserve biodiversity in both rural and urban settings [1]. Parks, gardens, rivers, beaches, playgrounds, basketball courts, pools, plazas, bike trails, bridges are all examples of GI. Eco-system services provided by GI are numerous involving clean air, climate regulation, flood prevention, pollination, and recreation [2]. Thus, GI is important for achieving sustainable development, and mitigating adverse effects of climate change.

Maintaining and developing GI is challenging in urban areas as they continue to expand both in terms of density and horizontal area. Several European strategies have so far been introduced to foster urban GI emphasizing the spatial dimension of the problem [2]. Enhancing GI is a spatial problem for several reasons. First, GI is an interconnected ecological network, and networked nature of this infrastructure has to be assured at different scales. Second, spatial distribution of GI has implications regarding spatial-equity, ecological balance, and thus territorial cohesion. Therefore, spatial pattern of GI is as important as its amount.

Urban plans are a main source of information to study spatial patterns of GI; however, these plans do not reveal information on social relevance of public spaces, or user's preferences. Location-Based-Social-Networks (LBSN) permit analyzing GI from user point of view and guide GI management and planning at different levels [3].

## 2. Problem Statement

Métropole du Grand Paris is the largest urban region in the European Union [4]. It already faces the effects of global warming [5] and aims to improve resilience of the area via sustainability transition [6]. Maintaining and developing GI is thus crucial for the area. The objective of this study is to explore the spatial pattern of GI in Métropole du Grand Paris by taking user's preferences into account and shed some light on the spatial-equity dimension of the current GI in the area.

## 3. Empirical Strategy

Métropole du Grand Paris consists of the city of Paris and some communes located in the inner and outer suburbs of the city. The city of Paris contains 20 arrondissements, which I will treat as individual neighborhoods. Communes located in inner suburbs refers to all 123 communes of Hauts-de-Seine, Seine-Saint-Denis, and Val-de-Marne. Whereas communes located in outer suburbs refer to 7 communes located in l'Essonne and le Val-d'Oise. The arrondissements in the city and the communes make in total 150 neighborhoods.

I will obtain the list of these neighborhoods and data on their geographical coordinates, as well as their population density. Next, I will use the list of Foursquare categories identified by Marti et al. [3] as GI elements to identify GI related venues in these neighborhoods. Finally, I will use k-means clustering to analyze spatial pattern of GI in Métropole du Grand Paris.

#### 4. Sources and Description of Data

I obtained the list of arrondissements of the Paris city from the website of INSEE, which is the National Institute of Statistics and Economic Studies [7]. The data file includes information on the population and surface area of the arrondissements. I completed the information on neighborhoods by acquiring data on communes of the Métropole du Grand Paris from an open platform for French public data [8]. This data file also includes information on the population and surface area of the communes. Using the same open platform, I accessed data on geographical coordinates of the neighborhoods [9].

Finally, I obtained the list of Foursquare categories that can be considered as GI elements from the study of Marti et al. [3] and get data on venues from Foursquare.

#### References

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