

ABOUT THE NATIONAL LIBRARY BOARD

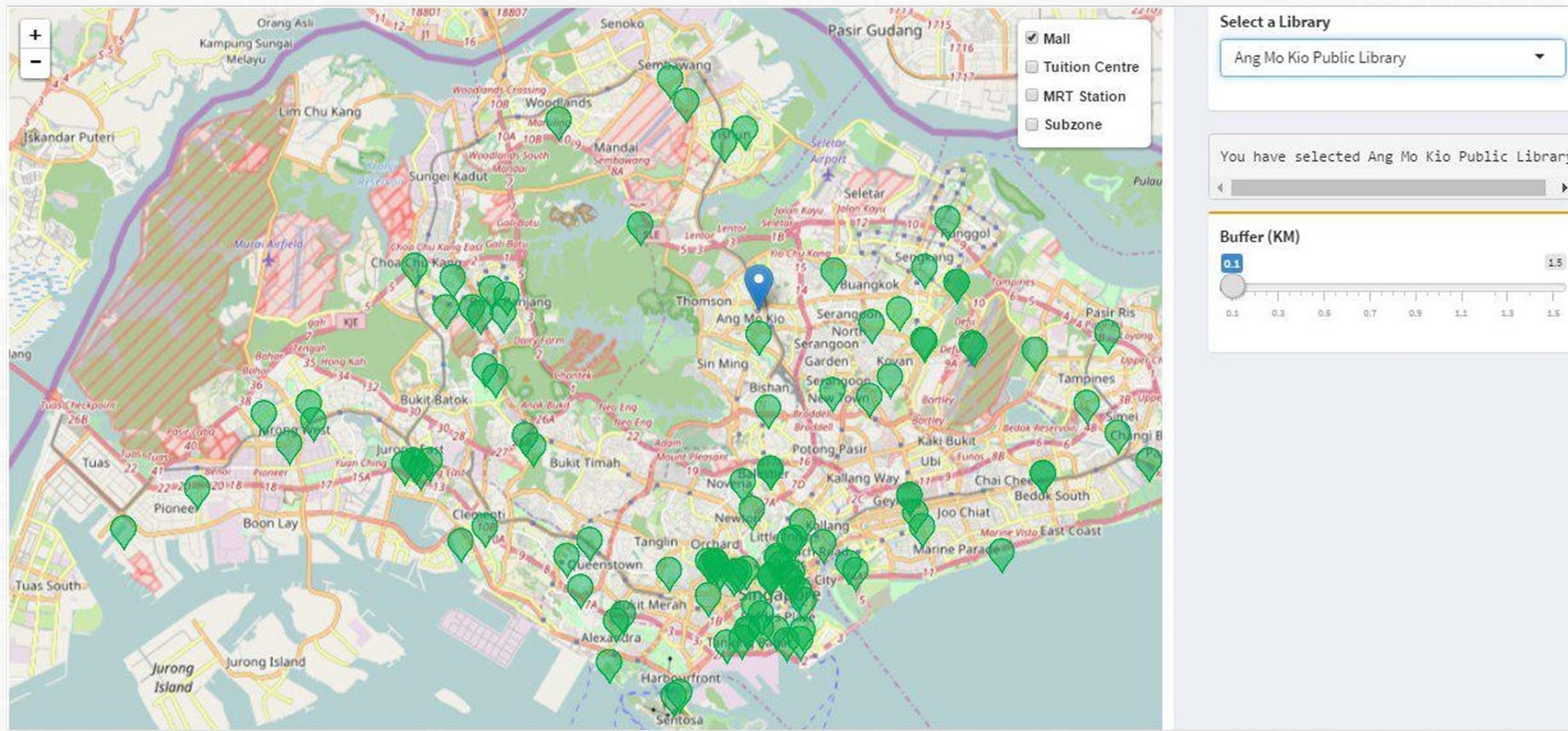
The National Library Board (NLB) is a statutory board of the Ministry of Communications and Information in Singapore. Preserving a sizeable amount of title collections in the regional and public libraries which it manages, the NLB seeks to serve as a reference source for the Singapore population to connect with the precious archives of the past. Strategically scattered over the island, the NLB has its collection of physical heritage in the 27 Regional and Community Libraries under its arm.

PROJECT OBJECTIVE

The aim of this project is to create a geospatial dashboard for the NLB to conduct what-if analyses with respect to changes in library demand. The dashboard should also be able to provide valuable insights about their patrons, as well as help evaluate effective placements for libraries. The dashboard has a number of functions to fulfil these purposes. Future policies and implementations will then be facilitated with a holistic understanding of the library network effect.

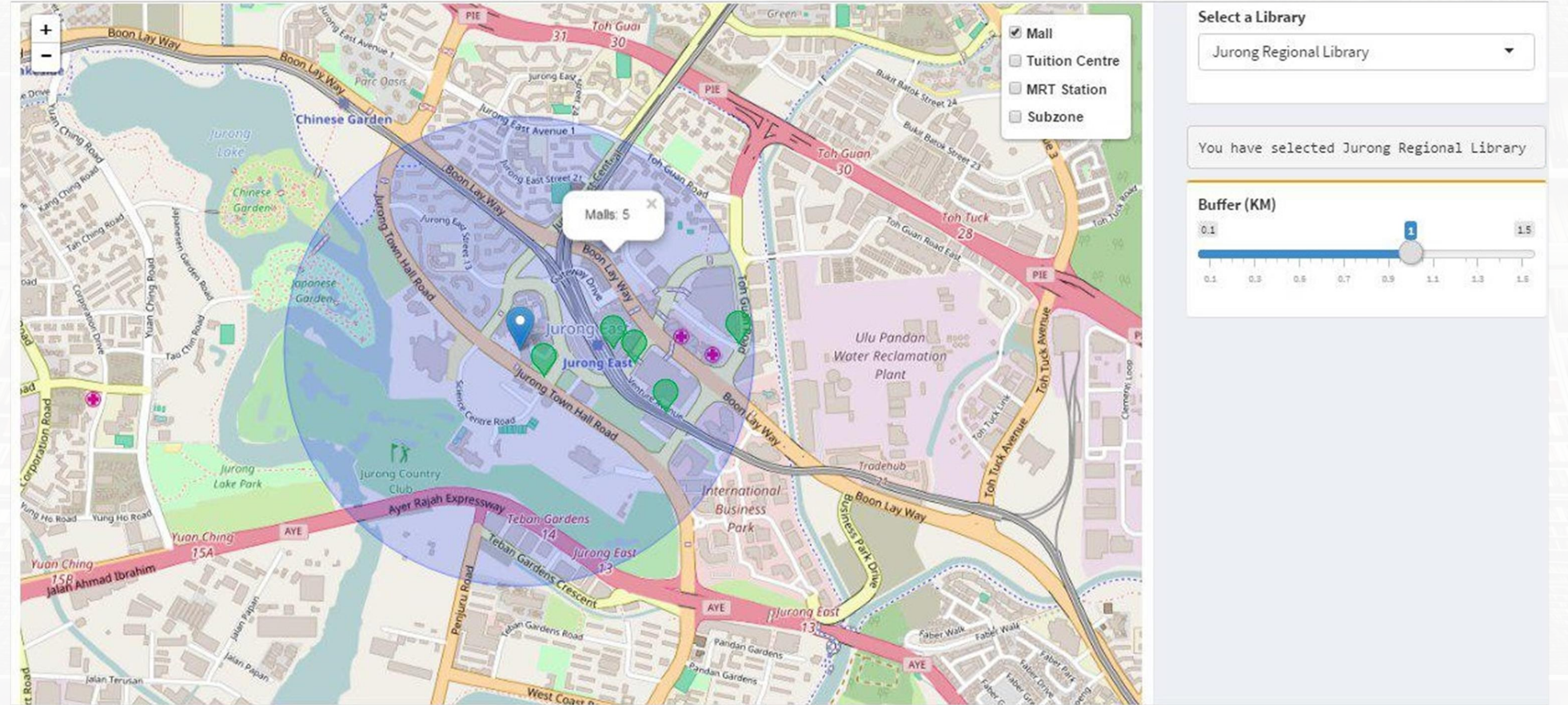
GEOSPATIAL DASHBOARD

MARKER LAYER



The locations of libraries and nearby amenities will be clearly illustrated using a map visualization. It will allow the user to select specific libraries and facility layers. The features from these layers will be displayed as markers, and the user can click on these markers for more information about the feature. This map layer will be the base for the other functions of the dashboard.

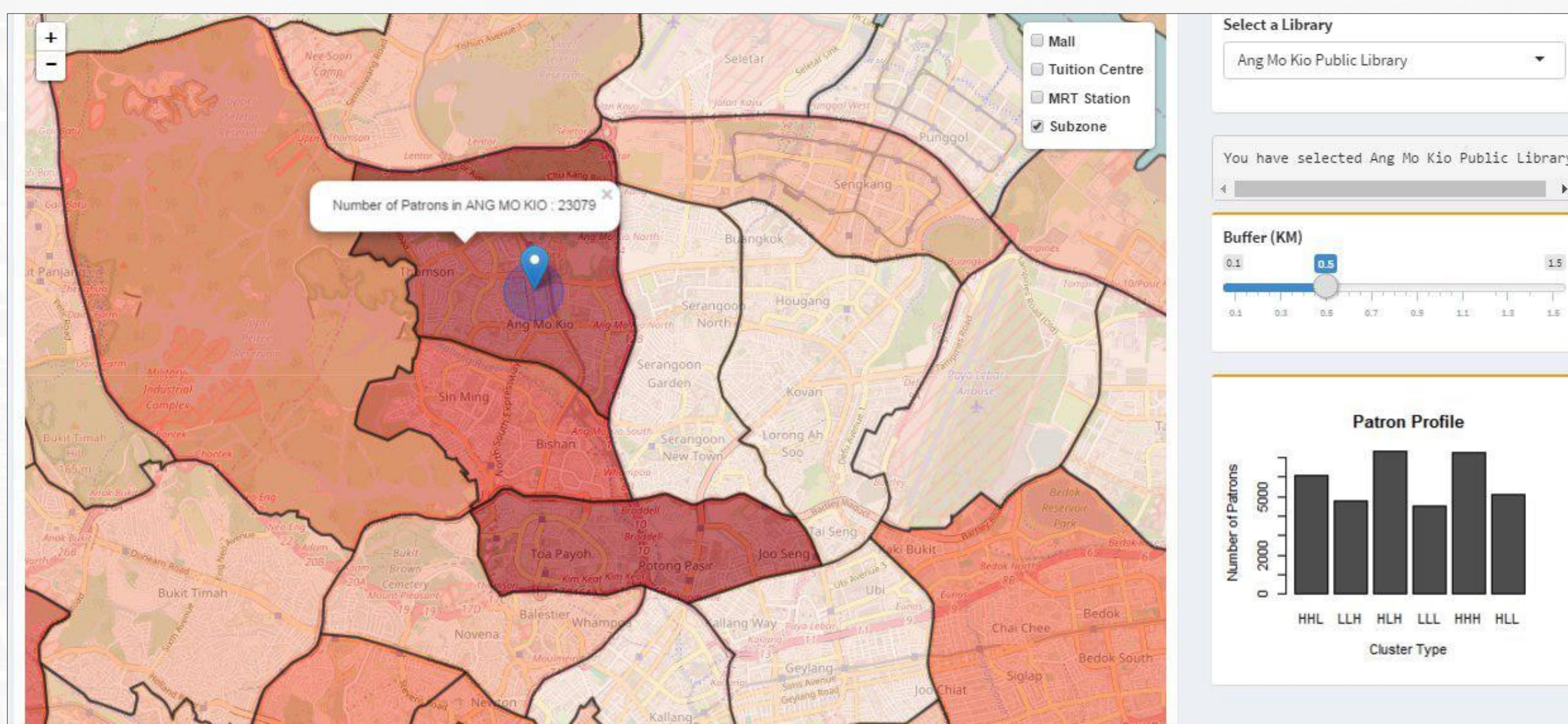
ADJUSTABLE BUFFER



The adjustable buffer area provides the summary statistics about the number of amenities near the chosen library. Using a slider, the user can adjust the radius of the buffer area around the library. Clicking on the buffer will reveal information about the number of each facility type that falls within the buffer area. As we intend to conduct a trade area analysis for the various libraries using the Huff's Model, the summary statistics will also be used as an input to calculate the library's attractiveness index.

CHOROPLETH MAP & PATRON PROFILE

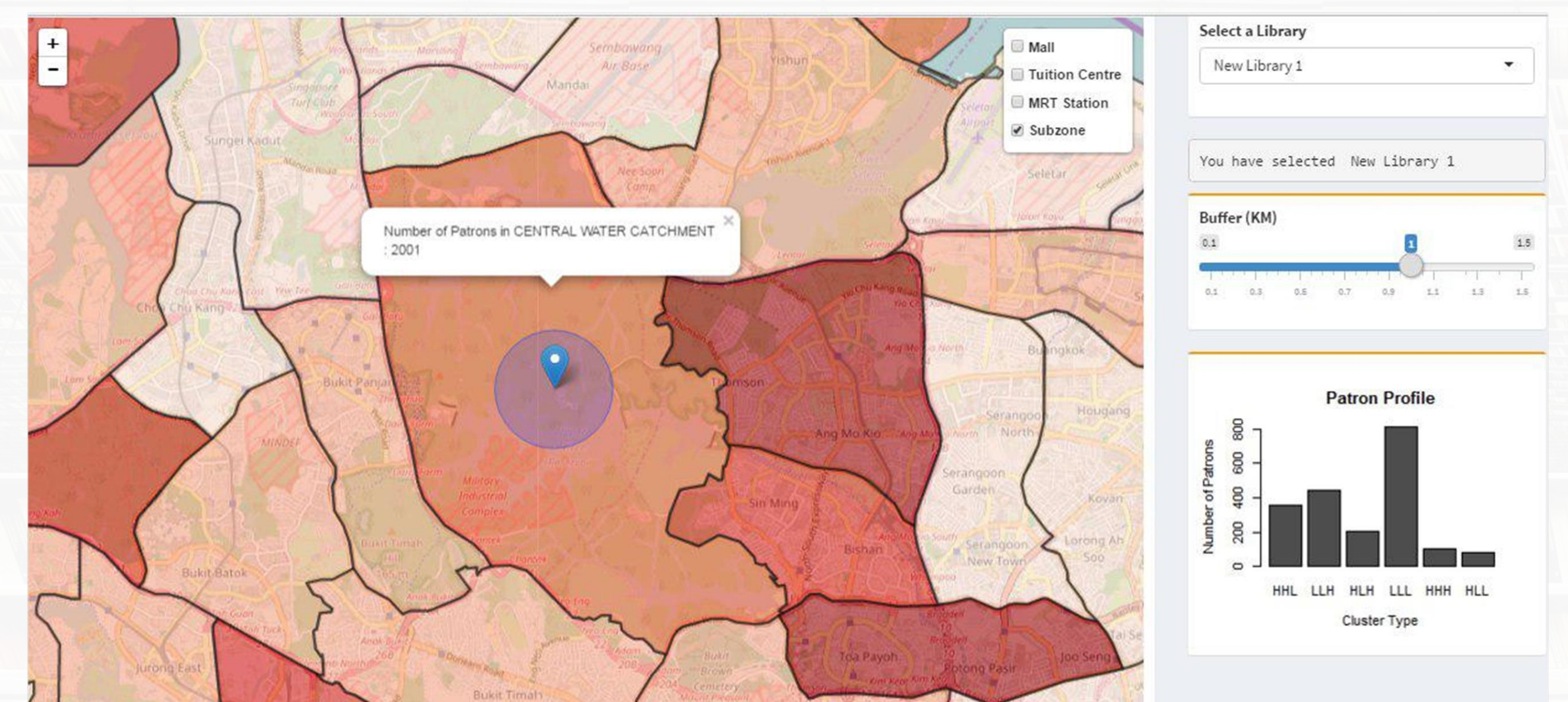
A choropleth map is used to visualize the patron flows to a library. Each polygon represents a Planning Area. The patron movement of interest is the proportion of patrons going to a library from each Planning Area. A darker shade on the map represents a greater patron-flow from the area. Users can easily identify Planning Areas with the most or least patrons, and take measures accordingly. From the screenshot, we see that most of the patrons going to Ang Mo Kio Public Library live in the corresponding Planning Area.



Understanding the profile composition of patrons is also important. Thus, patrons are segmented into groups using the RFM Market Segment Analysis. The variables Recency (R), Frequency (F), and Monetary (M) are adjusted to fit the library context, i.e. the Monetary (M) attribute refers to the number of books borrowed per transaction. The k-Means clustering method is used on the 3 variables, with output of 6 clusters. A bar graph at the bottom corner of the dashboard shows the distribution of clusters in a Planning Area, with their characteristics as labelled. A cluster with the HHH characteristic contains patrons with high R, F and M traits. Planning Areas with a large number of infrequent readers can then be identified. The NLB can use this insight to conduct appropriate policy measures on these identified areas.

APPLYING THE HUFF'S MODEL

The Huff's Model function allows the user to estimate a library's demand when changes are made to the locations of other libraries. The model is built using historical data from NLB, as well as other parameters like the number of amenities near a library, and the distance of each library from each subzone. Users can add, remove, or move the location of a library, and the model will be used to predict the patron flow to the new library as well as existing ones. Using this information, the NLB staff can conduct what-if analyses with regards to library placement, to identify the best locations to place their libraries to maximize patron flow.



TECHNOLOGIES

