PLACEMENT OF OUTDOOR RECYCLING CONTAINERS AROUND UBC CAMPUS

UBC SEEDS Project

by

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INTRODUCTION

This SEEDS (Social, Ecological, Economic Development Studies) project is intended to locate possible sites for the placement of outdoor recycling containers on UBC-Vancouver campus. Initiated by David Smith, the associate director of municipal services in UBC Plant Operations, this project aims at identifying major crossroads according to the volume of population flow/traffic. Due to the limit of budget, it is proposed that five to ten of these recycling containers will be placed in the first year, and more will be added afterward. Thus, the final map shows the first nine spots based on areas of high traffic; and other seven more spots for the next priority.

UBC Waste Management holds several recycling programs to promote waste and litter reduction. Its waste management fleets collect recycling items such as paper products, cans and bottles, e-waste such as computer equipment, and compostable waste such as food, animal and yard waste. This new outdoor recycling container is a cluster of three receptacles – paper products, cans and bottles, and non-recyclables. Previously, there were five of these pilot recycling containers on campus; however, although according to David Smith that two remained near UBC bookstore and Forest Science Center (FSC) whereas the rest were burnt, only the one near FSC is found. Besides, many students revealed unnoticed about the existence of these outdoor recycling bins.

According to the 2005/06 Annual Report from UBC Sustainability Office, the Waste Management program diverted 42% of garbage in 2004/05 and the rest went to recycling and composting despite a 24% increase in students from 1997/98, and the paper waste was decreased from 866 tonnes to 809 tonnes in a year. Its outstanding achievement implies that students are aware of environmental pollution and are likely to do recycling if services are available. Since most of these recycling bins such as blue and gray bins and deskside paper bins are only kept indoors, it confines the recycling activities outside infrastructures. Therefore, the launching of outdoor recycling containers can help to maximize the collection of recyclable items in order to approach our goal towards a waste-free environment.

DATA & PROCEDURES

Base Map

The outline map of UBC is provided by Jeff Burton, who is the municipal landscape designer of UBC Plant Operations. It includes major and site roads, soft landscape, hard landscape, location of bike racks, benches and garbage bins, individual tree stands, and annotations of buildings and roads. The output map only used roads, soft landscape and hard landscape (later defined as infrastructure) layers. The location of bike racks, benches and garbage bins, and individual tree stands were applied as a spatial reference of surrounding properties when selecting possible locations for new containers. These layers were not added to the output map because their discrete nature would distract map readers from focusing on the main purpose. The annotations were not shown first because fonts became blurry when transforming from ArcMap into GIMP during image edition, second because the client, David Smith, is already familiar with the site; therefore, only names of the major roads were added in the main map, and third because building names would be blocked by the shades of buildings in the main map anyway.

Statistics

The majority of the map statistics is derived from the 2008/09 Building Utilization data obtained from the UBC Enrollment Service. The raw data includes the rooms of each building being booked, the capacity of each room, the numbers of hours used each weekday, the weekly hours used in each room, the average, minimum and maximum class size of each room. Totally, there are four tables, each containing the above data, but each referring to Term 1 and Term 2 Lecture and Seminar Classroom Utilization and Term 1 and Term 1 Undergraduate Teaching Laboratory Utilization.

My first approach was to divide each of the four tables into lecture-hall size (above 100 attendees) and classroom size (under 100 attendees). Next, the average weekly hours used is calculated by the average of the sum of weekly hours used of all lecture-size in a building, and the average weekly attendance is calculated by the average of the sum of average class size of all lecture-size in a building. So on so forth calculating for Term 1 and 2 lecture and laboratory

utilization for lecture-hall size and classroom size, it came to eight tables at last. In order to combine all these results into two maps – one showing the weekly hours used in each building and another showing the weekly attendance in each building – there were other technical operations in ArcMap such as turning the layers into rasters, weighting and mosaicking the layers, and so on. However, this approach ends up with a huge problem – data loss. The procedures of "taking the average of the average" cause the data to be too standardized, and thus lose its reliability.

Not until I revised the raw data did I realize my overlooking of the data and over-complicating the procedures. Thus, the second approach simply multiplied the weekly hours used by the average class size of each room or laboratory in each building, and added all the rooms and laboratories of the building. The preliminary results were two tables – the total attendees of the building per week in Term 1 and 2. Although the total numbers for Term 1 and 2 were different, combining both data into one map could still be easy by dividing both numbers by their total and made both maxima equal 1 (100%). The output result is shown in the small upper map of the poster, using Natural Break for the classification.

Survey

Since the quantitative data only takes into the account of buildings for academic purpose, other important infrastructures such as SUB (Student Union Building), REC (Student Recreation Center), aquatic center, and so on are not considered. Nevertheless, some of these places have high population traffic, which means more pedestrians will likely use the outdoor recycling containers. Although as a student myself who already know which places are densely populated, biases may also arise due to my personal preference or daily routine. Therefore an Internet survey had been forwarded to ask participants to list the places where they mostly visited in UBC, without any further acknowledgement about this project. At the end, there were 23 participants from different faculties, and the most placed voted are the bus loop, REC, SUB, aquatic center, Koerner Library, Irving K. Barber Learning Center, David Lam Library, Scarfe Library, and Woodward Library. Some participants also include parkades, which shows other directions of traveling in and out UBC apart from the bus loop. The output result is mapped on the small lower map of the poster.

SITE SELECTION

Shaded infrastructures in the main map are areas where population density is high. These infrastructures are chosen based on the results from the statistics and the online survey. The red recycling symbol not only represents the first priority of placement sites, but also correlates to the color of highest population traffic. The recycling symbol for the second priority uses the next chroma, orange, to represent other areas of interest. It also correlates to the color of lower population traffic shown in the small upper map. The current recycling containers uses a totally different hue, blue, to indicate no relationship with the statistics and survey results.

It is assumed that the denser the population in a cluster of buildings, the more pedestrians are likely to travel between these buildings. Thus, the first priority considers crossroads on highest traffic flow, usually are between densely populated buildings or are along the direction flow. The second priority attempts to spread the recycling containers evenly across the campus but remains close to high traffic flow. The following explains the reasons of the location of the first-priority sites.

- Between REC and SUB: This is the most common crossroad bus travelers would likely pass. Besides, it is located between two high-density public places where a conglomerate of different people, officers, students and retailers amass.
- Between SUB and aquatic center: This open area is frequently used for setting up promotions and activities. Even on a usual day, it is always crowded with people gathering for lunch or as playground.
- Memorial Road/East Mall: It is one of the entrances into the academic departments – Buchanan and Music buildings. The recycling container is placed here also because it is close to the Irving K. Barber (I.K.B) Learning Center and the Brockhall.
- Agricultural Road/East Mall: This is one of the busiest road which connects SUB with a clusters of academic departments such as Chemistry and Hennings, and the I.K.B. Learning Center.
- Agricultural Road/Main Mall: This spot is among a cluster of departments including Business, Chemistry, Mathematics, and Geography, and is near the Koerner Library. A second reason for this location is due to its closeness to several edible places where the public gathers.

- University Boulevard/East Mall: Due to the disappearance of the old recycling container at the bookstore, this new one should be placed again at this busy crossroad. Ideally, it should be placed in front of the bookstore, not only because of the massive visitors of the bookstore at the beginning of term, but also because this direction connects the Village with the middle of the campus.
- University Boulevard/Main Mall: This spot in front of the Scarfe Library is another high traffic crossroad between the library, Biology building, Chemistry building, and the School of Business.
- West Mall in front of Swing building: Although statistically only the Swing building is classified as a highly-dense building in this area, it is adjacent to the West parkade and has the Psychology and the Continuing Studies buildings around. Besides, this part of the campus has less numbers of outdoor recycling containers. This is why it may be more useful to place it at this area instead of near the Fraser River parkade, which has similar surroundings.
- Health Science Mall/Hospital lane: This crossroad connects the Woodward Library with Science and Engineering buildings around it. This is the path which is mostly taken by Science students.

DESIGN

The design idea of this project is being neat and informative. Being a cartographer, the goal is to make aesthetic maps, not to lie with maps, and be ethical. Aesthetic maps mean to organize information and graphics effectively so that information can be extracted without distorted from the visually appealing maps. Cartographers should be honest to the audience about the data, which means they should not prejudice the data and skew the data into their predicted frame. Being ethical is not to intentionally arrange or falsify the information so that it favors a particular group of society.

In *Envisioning Information*, Tufte addresses that the fundamental problem in “escaping flatland”, presenting the real-world data in a flat, 2-dimensional paper, is to “work at the intersection of image, word, number, and art” (Tufte 1990: 9). For example, the Napoleon March introduced by

Tufte in the Beautiful Evidence shows a sophisticated design that assists analysis and critical thinking. It combines multiple variables beautifully and demonstrates the quantitative data effectively. As a communication tool, maps should deliver the exact messages that the cartographers want the map users to receive. According to MacEachren, cartographer should minimize the filtering or loss of information during map processing in order to maximize the effectiveness in map communication (MacEachren 2003: 5). In MacEachren's model of information flow, it explains that information may be lost or altered during the transmission from the cartographer's interpretation, design and symbolization to the final map product.

A good map can communicate information visually through its graphic design. It can also allow critical thinking and tells the truth. In this project, the final map contains three images. The main map in the middle depicts the central purpose – selecting possible locations for outdoor recycling containers based on the major crossroads where the population traffic flow is high. Choosing a meaningful map symbol is important because a symbol can be a schema that provides an pre-existing perception to the map readers and lead the map readers directly into the theme of the map. In this project, a recycling symbol is employed to give the map readers the first impression about recycling and sustainability without reading the title. The two supplementary maps on the bottom elucidate how the priority locations are selected based on statistics. The text box provides a brief explanation of the project, as well as some insights into the three maps.

Basic map-making processes including projections, generalization, symbolization, and classification may give rise to data loss through standardization and simplification. As a result, maps become less accurate and less reliable. For example, a Mercator projection will exaggerate areas close to the North pole, which may create political propaganda by exaggerating the size of countries. Generalization can also erase detailed spatial reference; however, its practice depends on what level of details the map users need. Although this project does not encounter any problems on projections and generalization, the selection of which statistical data to be used and what classification method is applied can greatly affect the output result. As described above, my first approach to calculate the “average of the average” had tremendously altered or standardized the statistics. The error causing this wrong approach is due to my interpretation of the original data. Understanding the data is a crucial step to begin because a cartographer's misinterpretation can

deliver wrong messages into the map. The second approach is straight-forward so that most of the original statistics is preserved.

Although the ethics issues in this map does not seem prominent, it does appear to favor the west (left) side of the campus if we divide the campus into half along the University Boulevard. Some people may even view the west side as Arts and the right side as Science. More outdoor recycling bins appear to be placed on the Arts side. This may induce controversy on the cartographer's bias. Nevertheless, the supplementary maps provide statistical proof that shows a higher-density clusters of classrooms on the west side. In fact, most of the buildings on the east side are laboratories, compared to more lecture hall-sized classrooms on the west, thus less students are crowded within one building.

CONCLUSION

Cartography is a powerful communication tool to convey information. An effective map can govern what knowledge or information should a reader be receiving. However, it is a cartographer's morality to be honest to the map users. Every map-making step inevitably simplifies the real world because information has to be compressed into a flat, plain paper. What a cartographer can do is to minimize the alternations and provide detailed source for the readers to trace the accuracy of the map.

ACKNOWLEDGEMENT

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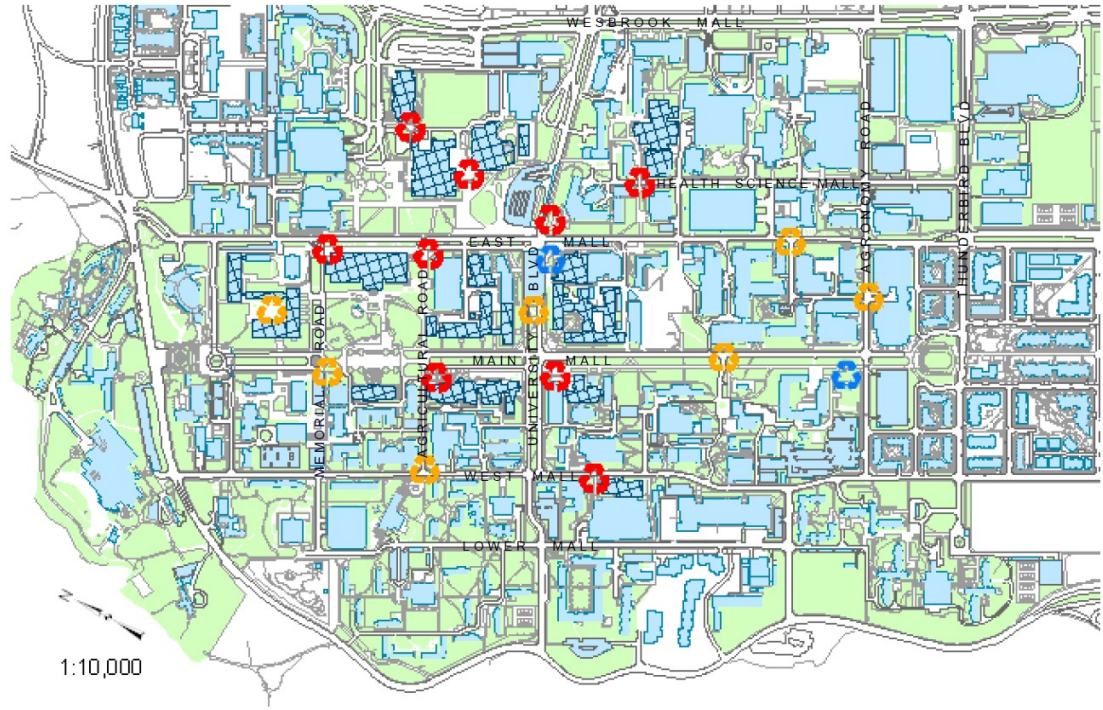
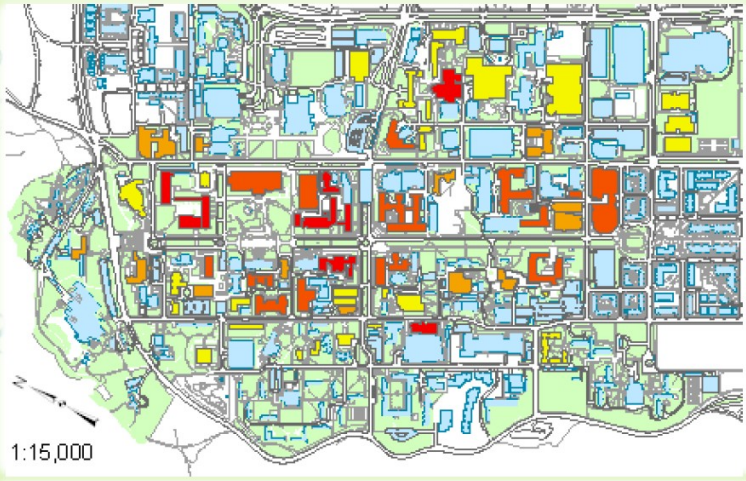
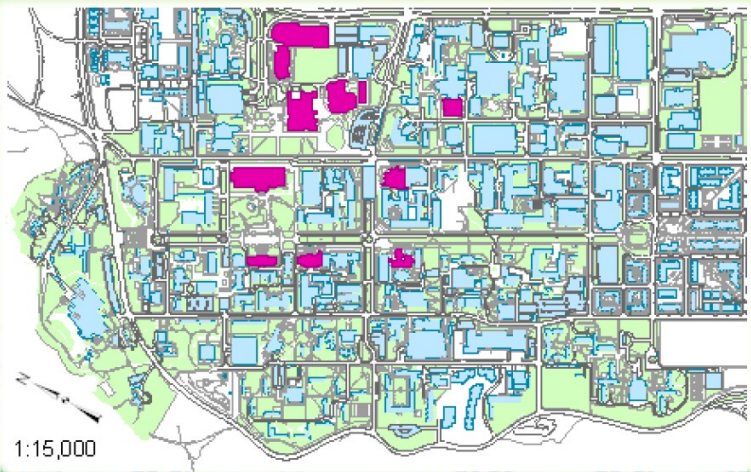
SEEDS
Placement of Outdoor Recycling Containers







Top 8 spots
Priority spots
Current containers
Infrastructure
Soft landscape
High traffic bldg.

Weekly Building Utilization
Hours of booking (%) Natural break
0.1 - 6.4
6.5 - 25.2
25.3 - 57.5
57.8 - 99.7

Popular Areas
Survey results
Areas mostly visited

About the maps . . .

With ever-growing population, UBC Waste Management strives to make UBC a sustainable community by collaborating with other organizations, one of them is SEEDS. This is a SEEDS project which aims to locate new spots for additional outdoor recycling containers around UBC campus.

The upper small map shows the percentage of classroom hours being booked weekly. In 2008/09 year, there are 495 and 481 rooms being booked and 435049 and 412206 attendees in Term 1 and 2 respectively.

The lower small map plots the areas voted by 23 students from different faculties in a survey. These places include bus loop, SUB, REC, Aquatics, bookstore, I.K. Barber, Woodward,Koerner, David Lam, and Scarfe libraries.

The main map selects the spots for new recycling containers, based on the assumption of more pedestrians among highly-ultilized buildings.

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Data source: UBC Enrolment Service
Base map: UBC Plant Operations

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