Mapping Edible Food Places on the UBC Campus

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Final Project
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Introduction and Project Overview

The purpose of this project was to create a map of the community gardens, and fruit bearing trees and bushes on the UBC campus. The project was created as part of the UBC SEEDS program, which joins students, staff, and faculty to work on sustainability issues. The map was made for the use of the UBC Plant Operations staff to be able to perform necessary maintenance on existing fruit trees, and to show students and the public the locations of food producing plants on campus for the purpose of conducting research. Locations of plants and community gardens were provided from a number of sources and ground checked for accuracy. The map was produced in PDF format and the data layers were also provided in Google Earth KML format. As well, a File Geodatabase was created and submitted to UBC Plant Operations GIS staff for the maintenance of spatial records. Ultimately the map depicted 52 different fruit trees and bushes, as well as two herb gardens, two community gardens, and the location of the UBC Farm. Because of the small scale of the objects being mapped and the dense clusters of different types of trees, unique solutions to data visualization had to be devised. The mapping project simultaneously fills a number of roles for a number of interested parties, including students, faculty, staff, and the general public.

Methodology

Step One: Consultation

The first step of the map design process was to consult with Plant Operations, SEEDS staff, and the course instructor for Geography 472 to determine the scope of the project. The spatial extent of the map was defined as covering the boundaries of UBC, including the UBC farm. During the meeting, it was decided that because of privacy issues, locations like the Acadia community gardens were to be left off the map. The

UBC Botanical Gardens were also excluded from the map because of time constraints and the fact that the UBC Botanical Gardens is an existing managed entity that is accessible to visitors. After determining the extent and elements needed on the map, a number of contacts were made to determine details and locations of the existing edible plant features. Grayzna Rogeau, the Plant Operations gardener provided the locations for all of the trees and bushes on campus. Andrew Riseman provided the measurements for the Land and Food Systems orchard garden. Liska Richer provided the locations of the balcony garden at Sage Bistro and the AMS Herb Garden in the SUB. Mark Bomford was contacted for information about the UBC Farm, but was not able to provide any data. Jeff Burton provided a Geodatabase containing roads, buildings, and existing tree information for the campus.

Step Two: Data Collection and Verification

The existing UBC trees database was first queried for a variety of fruit tree species. This list was then taken to Grayzna Rogeau, the UBC Plant Operations Gardener to determine which species were actually fruit producers, and to determine other sites which had fruit trees or gardens. Many of the fruit trees in the UBC trees database were ornamental (non-productive) or had been removed from the physical landscape. Extremely large scale maps were printed off for each site containing the road, building and existing tree information. Each site was visited on foot and trees were mapped by hand onto paper. Community gardens were also sketched by hand; a GPS unit was not used because of the easy of hand sketching, as well as the requirement for the data to be incredibly spatially accurate. Since the existing data provided by Jeff Burton was very detailed, locations of individual trees were mapped in relation to their geographical

surroundings. The relative distances of plants to sidewalks, parking lots, and roads were taken into account for the placement of points and polygon features.

Step Three: Data Input

Data was then input into a File Geodatabase and given attributes based on the common name, genus, and species, or garden name. Trees that were found to exist in the UBC Trees database were copied to the new database. Data was then plotted on a series of site specific large scale maps and verified on the ground for accuracy of species name and plant location. Locations of trees, bushes, and herb gardens were input in point format as a feature class, while community gardens were input in polygon format.

Step Four: Map Creation

A base map was then created showing the Pacific Spirit Park outline, as well as the BC Landmass datasets taken from the UBC Geography department server. Roads and buildings were added to the map as well. There were a number of very detailed datasets available for campus, but it was decided that only the buildings and roads were completely relevant because of visual clutter issues. Symbology was implemented by using black points combined with pictorial icons symbolizing all tree and fruit features and with bold green and yellow polygons symbolizing community gardens (see section about design decisions below for more detail). Annotation for buildings and roads, as well as a scale bar and north arrow were also added in ArcMap. The basic map was exported to Adobe Illustrator. Icons with simple lines and basic shapes were created by the author in Corel Draw and then exported to Adobe Illustrator. Text was edited to provide appropriate weight and colour, and lines and circles were drawn linking point information with pictorial symbols.

For the KML versions of the map, shape files with simplified attribute tables were created so that viewers could access relevant information to each map. The points were enlarged and made into bright colors in order to stand out among the chaotic amount of data that Google Earth displays (see Figure 1). Because some of the points did not show up exactly over trees when placed on top of the satellite imagery that Google earth provided, some adjustments were made to the spatial locations of points in the shapefiles and the database. Polygon community garden outlines were also exported from ArcMap to KML and were symbolized with bright colors to stand out against the visual noise of the satellite imagery.

Step Five: Feedback

The map was submitted in PDF form to all personnel who would be receiving a copy at Plant Operations and the SEEDS office, and feedback was encouraged. Based on this feedback, the roads were changed to a darker colour to make them recede further into the ground of the map. The herb garden icon was also redrawn in Corel Draw to make it smoother and more recognizable.

Because existing data about the farm was not made available, the UBC Farm was not mapped in detail. Feedback from Plant Operations staff indicated that a rough outline of the farm should be included on the map, and a textual description of the farm was added to inform map users of its existence. This helped maintain the balance of the map, and inform users about the importance of the farm.

Design Decisions and Analysis

In order to ensure that information was portrayed correctly on this map, a couple of design decisions were taken to make sure that the data was easy to find on the map and

that the representations of the data made sense. These decisions were meant to improve the communicative worth of the map, a process which is described by MacEachren as reducing the "loss of information at various points" in the map communication system.[1] In the same vein, this attempt to simplify and clarify the map so it specifically addresses the needs of the map users is accomplished by reducing the input of noise into the channel of the cartographic communication system.[2] Decisions were made to direct the viewer's attention to various symbols on the map, and to reduce noise by removing the clutter of unnecessary and extraneous information.

Point Symbolization Decisions

The map required a balance between describing exact locations of points that were clustered in proximity to each other, while allowing for seven classes of nominal point data to be represented within these features. Because of the density and the feature sizes, a unique symbolization system was designed to allow for peripheral scanning (identifying clusters and general locations of trees and bushes) and foveal perception (determining exact locations of trees and their species type). For peripheral scanning, the features were designed to be distinct in shape from the rest of the square shaped streets and buildings on the map. The icons were given a black outline to stand out against the rest of the map, and also because peripheral vision lacks colour receptors, a bold dark line was needed to make the icons catch the map reader's eye.[3]

In order to balance making the features stand out, while being precisely located and easily recognizable, a number of symbolization techniques were experimented with before the final option was chosen. The first option was to provide a series of small pictorial icons, reduced in size (size 6 in ArcGIS) to prevent icon overlap in crowded

areas that would mark each tree (see Figure 2). This option did not allow for each feature to stand out enough for peripheral scanning, and made it hard to interpret the pictorial representation because of the icon size. The second option was to enlarge the pictorial symbol to size 16, which would allow for the icons to stand out better, and be interpreted easily (see Figure 3). This option's main problem is the overlap of icons, and the lack of ability to determine the exact location of the tree, since the pictorial icon covers a much larger area on the map than the exact tree location. A third option was to use coloured dots to represent each tree (see Figure 4). This option would allow for a very specific location to be represented for each tree. While this option was better than options one and two, the dots would easily be missed by peripheral scanning, especially in the case of isolated dots that are not located in clusters. Since I liked the precise locations that the dots provided, but also the easily interpretability and eye-catching nature of the larger pictorial symbols, I decided to combine these two methods for the final map (see Figure 5). This approach allows the eye to be drawn to clusters of trees, then to determine the species of tree based on the tree colour, and finally understand the exact location based on the individual dot that represents each tree.

The method I chose for symbolizing point features is effective for peripheral scanning as well as foveal inspection. The same method of combining geometric point symbols and pictorial point symbols was applied for the representation of herb gardens and blueberry bushes. These symbols (for trees and blueberry bushes) were designed to be simple, pictorial representations of the data, and do not require the use of the legend to understand their basic significance. The symbol for herb garden is, on the other hand a representative symbol, and was designed in such a way because of the difficulty of

pictorially representing an herb garden in an icon. On the whole, the icons on the map are more mimetic than arbitrary.[4]

Use of Colours

The map's colours were chosen to be associative for all the representative data. Approximate fruit colours were chosen for each tree (red for apple, purple for fig, etc.) and community gardens were labeled with a bright green. The community garden polygon features on the map were also made to stand out from the ground of the map, as they were brightly coloured and outlined boldly, in contrast to the buildings and roads, which had minimal outlines and were less bright. In this way, the map was meant to be interpreted with minimal use of the legend.

Discussion and Map Effectiveness

In order to discuss the effectiveness of the map, it is useful to keep in mind four basic questions that Board defines as useful for evaluating the effectiveness of maps in order to reflect upon the how the tasks of Navigation, Measurement, and Visualization can be carried out: "(1) what sort of map? (2) for whom is it intended? (3) Under what conditions will it be used? (4) What map reading tasks are appropriate to the stated purpose?"[5]

In terms of Navigation, the map reader of this map will probably be an individual with an idea of the location and basic layout of the UBC Campus, which is why no inset maps were used to show the general location of the map. The user should be able to orient the map based on the North Arrow and the text layout. Searching for basic landmarks on campus such as major roads and buildings should not be difficult, as this is the main source of reference information on the map.

In terms of Measurement, hopefully the map user will be able to detect and identify particular edible food places on campus. The users for this map will most likely only be interested in the lowest level of measurement (nominal) which would involve the tasks of counting different tree features.

The visualization process for the map hopefully will be helped by the pictorial representations of the trees combined with the reference information of roads and buildings. This should help the map users to draw up associative mental pictures of the particular places on campus in order to try and imagine the locations of edible food places.

Particular attention should be paid towards Board's third question of "Under what conditions will [the map] be used?"[6] Obviously the map's size (22x34) inches makes the map cumbersome and unwieldy for portable use in the field. The map was created specifically to be hung on the wall of the Plant Operations staff room, and is useful for that purpose, but would not be a very portable map. Because having a portable version of this map to carry while visiting multiple edible plant locations on campus may have been useful, the map does not appropriately address this particular situation.

Conclusions

This map accurately displays the existing edible food places on campus, and gives their accurate spatial locations. The supporting data provided in the form of Google Earth KML files will supplement the map information and provide specific species and genus information for the trees and bushes. It was unfortunate that the UBC Farm could not be mapped in more detail, as it was deemed important by representatives from the SEEDS office and UBC Plant Operations who requested the map. There is a potentiality for the

map to be updated in the future to include the farm, and the map was able to more effectively communicate the location and purpose of the UBC Farm. This mapping project also provided the data administrator at Plant Operations a necessary update to the current trees database,

While the map shows a wide variety of fruit trees, bushes, and community gardens that exist on campus, it also highlights the large space for more edible plants to be installed on campus. This has is very of relevant for students or staff studying the issue of food security on campus, (and will be able to access a PDF version of the map at the SEEDS website) and who may be interested in installing more gardens and trees on campus. The map will also be useful for UBC Plant Operations Gardeners to easily locate and appropriately manage and maintain existing fruit trees and bushes on campus.

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[1] Alan MacEachren, How Maps Work (New York: Gilford Press, 1995) 4.

[2] Arthur H. Robinson and Barbara B. Petchenik, "The Map as a Communication System" Cartographic Journal, vol. 12 (2002): 8**.**

[3] MacEachren, 56.

[4] MacEachren, 259.

[5] Christopher Board, "Map Reading Tasks Appropriate in Experimental Studies in Cartographic Communication". Canadian Cartographer, vol. 15 (1978): 5.

[6] Board, 5.

Works Cited

Board, Christopher. "Map Reading Tasks Appropriate in Experimental Studies in

Cartographic Communication." <u>Canadian Cartographer.</u> vol. 15.1 (1978): 1-12.

MacEachren, Alan. <u>How Maps Work.</u> New York: Gilford Press, 1995.

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<u>Cartographic Journal</u>. vol. 12 (2002): 7-15**.**

Edible Food Places at UBC

Legend

- Edible Plant Location
- Herb Garden
- AppleTrees
- Pear Trees
- Fig Trees
- Mulberry Trees
- Medlar Trees
- Blueberry Bushes
- Community Gardens
- Park Boundary

N
W E
S

Scale 1:2000
0 25 50 100 Meters

South Campus & UBC Farm

UBC FARM

South Campus Road

To 16th Ave

Westbrook Mall

About the Farm:
The UBC Farm is located on a 24-hectare site with 10 hectares of cultivatable land. It is the last working farm in Vancouver, and as such is positioned to serve an important role as a model sustainable farm. Ultimately, the goal is for the farm to be a self-sustaining, student-centred enterprise, providing a working model of an integrated small farm system, serving both the academic and the growing residential community on campus.

Map Created by Devin Bartley for the UBC SEEDS program
Base Map Data Source: UBC Plant Operations
UBC Farm information from the UBC Farm Website: www.landfood.ubc.ca/ubcfarm/
Thanks to: Grayzna Rogeau, Brenda Sawada, Jeff Burton, Liska Richer, Andrew Riseman

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Map labels

Cecil Green Park Road
East Mall
Geology Mall
Walter Gage Road
Gage Residence
Chan Centre
Curtis Law
North Parkade
Student Union Boulevard
Bus Loop
Rose Garden
Buchanan Buildings
Brock Hall
Graduate Student Centre
Crescent Road
Belkin Gallery
Main Mall
Main Mall
Memorial Road
Music
Main Library
Student Union Building
Aquatic Centre
War Memorial Gym
General Services Admin Bldng
Trolly Bus Loop
International House
C.K. Choi
Asian Centre
Memorial Road
Fraser River Parkade
Koerner Library
Math
Geography
Mathematics Road
Agricultural Road
Henry Angus
Saucier Lane
Chemistry
Hennings
Volkoff Lane
Hebb
University Boulevard
Westbrook
Woodward
IRC
Dentistry
Longhouse
West Mall
LSK
Biology
Bookstore
Biological Sciences Road
Hospital Lane
Hospital
Lower Mall
Vanier Residence
Ponderosa
Scarfe
Education Road
Kenny
Biological Sciences Road
EOS
Health Sciences Parkade
Civil & Mechanical Engineering
Purdy Pavillion
St. John's College
West Parkade
Main Mall
Sustainability Street
Barn
MacMillan
Kaiser
Engineering Lane
CHEM/BIO
RIX
Life Sciences Centre
Marine Towers
University Services Building
Agronomy Road
Land & Food Systems Orchard Garden
ICICS/CS
Forest Sciences Centre
Agronomy Road
TEF3
Agronomy Road
Thunderbird Residence
Logan Lane
Eagles Drive
Larkin Drive
Hawthorn Lane
West Mall
Thunderbird Residence Community Garden