Effect of Immediate Physical Environment on Opinions about Biodiversity

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PSYC 321

April 25, 2016

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LEED the Way

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Executive Summary

Biodiversity loss today is often caused by anthropological impact, and although most people are aware of this, biodiversity conservation action is relatively rare. One challenge with biodiversity conservation is that it can be too temporally or spatially distant for an individual to fully comprehend its implications (Macia et al., 2003). In this study, we asked university community members a series of questions on the location and conservation of biodiversity at different locations on campus. Each location varied in the amount of biodiversity present, the idea being that in a more biodiverse location respondents would care more its conservation as well as locate it closer to themselves. We found mixed results, but in general the biodiversity level of a location did not impact opinions on biodiversity. Our results suggest potentially different types of people may have different opinions on biodiversity, and people's choices to be in more biodiverse locations may be relevant to future studies on biodiversity conservation. This and future research may be relevant to university landscapers and planners attempting to gain support for conservation and create a biodiverse-rich campus.

Keywords: Biodiversity, Environment, Conservation, Opinions, University, Landscaping

Introduction

It has recently been accepted that biological knowledge cannot combat conservation problems alone; there is a need for psychology and the social sciences to come together and help conserve biodiversity (Mascia et al., 2003). This is necessary as often times human actions cause biodiversity loss, and it is human behavioural change that will help prevent further loss (Saunders, Brook, & Myers, 2006). Saunders et al. (2006) identified that one of the challenges in biodiversity conservation is humans have a difficult time thinking about things which are temporally and spatially distant; they also identified there is broad public support for environmental sustainability but disconnects between what people say and do often exist.

Research Question

Interested in this relationship, the focus of our study ascertained University of British Columbia (UBC) community members' views on biodiversity in relation to their current location, and by extension the amount of biodiversity in their current surroundings. UBC provides us with an interesting testing ground as the university has attempted to make sustainability a priority ("Sustainability", n.d.). This is coupled with Municipal and Landscape Architect, Jeff Nulty's emphasis on the importance of biodiversity. However, we were looking to gather clearer data as to how opinions of biodiversity, includings ratings of conservation importance and where they locate biodiversity are related to the amount of biodiversity in their current surroundings.

Hypothesis

We had two hypotheses: (1) individuals in surroundings that are more abundant in biodiversity are likely to rate biodiversity and its conservation as more important, (2) individuals are more likely to locate biodiversity, on a map, closer to their current surroundings. To examine this notion, we conducted a survey which asked UBC community members in various locations on campus where they thought biodiversity was located at UBC and whether or not they believe there is a need to worry about biodiversity conservation. We also investigated which types of biodiversity were most important to protect, and which sustainable initiatives community members support the most.

Procedure

The survey we designed consisted of five parts (see complete survey in Appendix B). We created our own survey, with the exception of part four, where the statements were adapted from a previous study. We chose to create our own survey so we could tailor the study to the UBC campus, and ensure that specific client questions were answered. Before conducting our study we had a few UBC graduates take the survey, to ensure instructions were clear.

Participants were recruited to do a two-page paper survey throughout March 2016 on days with clear skies (overcast or sunny). Each of the four researchers recruited an equal number of participants for each site, conducted the surveys in the same area for each location, and followed a standardized survey protocol, as to reduce the effect of researcher bias and variability. Participants were recruited by asking them to stop for a quick ten-minute survey. They were recruited from five locations on campus that varied in levels of biodiversity. These locations were selected and ranked in coordination with Jeff Nulty, UBC Municipal Landscape Architect.

Participants

We surveyed 83 participants, consisting of twenty people for each location. Before removing our second location from our survey, we had already gathered data from three people. Therefore, the total number of participants was 83. Of the 83 participants, 40% were male and 57.6% were female; two participants did not respond. At 70.6%, the majority of our participants fell between the ages of 18 and 25. 73 of our participants were students, 5 were faculty/staff, and 15 selected "other" which included tourists and volunteers. Between faculty members and students, the most common faculties were Arts (25 participants), and Applied Science (19 participants). The remaining 32 participants belonged to one of nine other faculties. When asked to locate "home", over 61.4% of participants selected within B.C., 12% selected elsewhere in Canada, and 26.5% selected somewhere international.

Conditions

Biodiversity was ranked from 1 (lowest) to 5 (highest). The lowest biodiversity location was the Civil and Mechanical Engineering building (CEME) where we stood in a basement corridor, away from any windows. The second location was the West entrance/exit to the Earth and Ocean Sciences building (EOSC). The third location was Martha Piper Plaza (MP), a central hub on campus as it sits at the crossroads of Main Mall and University Boulevard. Our fourth location was the area of the Library Gardens near the Irving K Barber West entrance/exit (IKB). Lastly, the highest biodiversity location was a pathway 25 meters after having entered the UBC Botanical Gardens (BG). For images of each location see Appendix A.

Measures

The first part of the survey collected participant demographic information. The second part included a top-down perspective of the UBC campus and its surroundings. We asked participants to identify on the map the areas where they thought biodiversity was located. Their responses were then overlaid in Adobe Photoshop to create heat maps. The third part of the survey investigated which types of biodiversity participants believe are most important to protect, and we categorized them into four types: oceanic, avian, ground-based, and plant-based organisms. For this part we had four rows, and in each row there was an organism that fell into one of the four categories. Each row included local organisms of relatively similar size. The participants were instructed to circle which type of organism they felt was most important to protect in each row. The fourth part of the survey included a Likert-type scale with questions amended from Kurz and Baudain's study on landscape preferences (2010). Participants were asked whether they strongly agreed (5) or strongly disagreed (1) on each statement made. Statements focused on how participants viewed the impact human-built urban developments had on different types of biodiversity; whether they believed issues of biodiversity are only relevant to wilderness areas such as national parks; and, whether the landscaping choices that UBC makes have any implications for the surrounding environment. The last part of the survey included open-ended questions that asked participants to define biodiversity, how they felt about it, and which steps UBC needs to take to protect it.

Results

Figures 1-5 (Appendix C) depict the areas of campus and the frequency at which they were selected as a biodiverse area. Bright pink areas mean the location was chosen more frequently than light pink areas. We had no access to a program that would measure whether or not the

participant's current location affected their responses in a statistically significant way; therefore, we made some visual observations of the heat maps instead. The maps suggest most participants find biodiversity to be present on the outskirts of campus including the Pacific Ocean and beaches, Pacific Spirit Park, and the University Endowment lands. According to our observations, participants do not necessarily locate biodiversity close to their current location. In Figure 1, very little biodiversity was selected to be located close to where the participant was standing when surveyed. However, Figure 4 displays there may be a relationship with participant's current location and where they believe biodiversity is located. We see a high concentration of biodiversity reported around the participant's current location in Figure 4, while on Figures 1-3 & 5 the same area is selected to a lesser degree.

Two components of the survey addressed which type of biodiversity (oceanic, avian, ground-based, and plant-based) is most important to protect and whether or not it should be protected. For both of these analyses, we removed the second-least biodiverse location (EOSC) due to lack of data. The first component were categorical questions in which participants were asked to select an organism to protect. All respondents who did not provide an answer for the row were excluded from analysis. Pearson Chi Square Analysis with Phi and Cramer's V yielded no significant association (see Tables D1-D4 in Appendix D) between the selected organism and participant's current location; in other words participants selected to protect the same organisms equally regardless of their current location. However, in each case, the data did have cells in which the expected count by SPSS 22.0 was not met. This may indicate that Chi Square Analysis was not the appropriate measure to use. The second component consisted of the Likert-style questions altered from Kurz & Boudain's 2010 study. As Tables E1-E2 (Appendix E) show, the data from the statements, "We need to worry about the impact of human-built urban developments on oceanic organisms" and "We need to worry about the impact of human-built urban developments on ground-based organisms" yielded no significant differences when analyzed with One-Way ANOVA's and Tukey's HSD Post-Hoc at $\alpha = .05$. These results suggest the current location of an individual has no noticeable effect on how they perceive the impact of human development on oceanic and ground-based organisms. However, for the statements "We need to worry about the impact of human-built urban developments on avian organisms" and "We need to worry about the impact of human-built urban developments on plant-based organisms", there was a statistically significant difference between participants' current location and level of biodiversity in that location, as illustrated by the p-values for impact of human development on avian organisms ($\alpha = .05$, $F= 5.242$, $p = 0.002$) and plant-based organisms ($\alpha = .05$, $F= 2.874$, $p = 0.042$). Figure 6 & Tables E3-E4 (Appendix E), which includes results from Tukey's HSD Post-Hoc, revealed for avian organisms, participants located at CEME (rated one on our biodiversity scale) believed the need to worry about the impact of human-built development on avian organisms was significantly less than those at BG (rated five on our biodiversity scale) where ($\alpha = .05$, $F= 5.242$, $p = .004$). Participants at IKB (rated four on our biodiversity scale) also believed the need to worry as significantly less than those at BG ($\alpha = .05$, $F= 5.242$, $p = .022$). Figure 7 & Tables E5-E6 (Appendix E) demonstrates participants located at CEME believed the need to worry about the impact of human built development on plant-based organisms was significantly less than those at BG ($\alpha = .05$, $F= 2.874$, $p = .028$). These results illustrate participants at CEME, IKB, and BG differ in their opinions to varying degrees on the need to worry about the impact of human development on avian and plant-based organisms, with participants at BG believing we need to worry the most.

Further analysis addressed whether or not participants believed UBC should play a role in protecting biodiversity. For this measure, we combined the results of two statements concerning UBC's role with biodiversity. Table E7 (Appendix E) illustrates the One-Way ANOVA did not produce statistically significant results, suggesting that across locations participants have similar opinions on UBC's role in protecting biodiversity.

However, when participants were asked to agree or disagree with the statement "The issues of biodiversity protection are only relevant to wilderness areas such as National Parks.", a One-Way ANOVA found very statistically significant results based on their responses and current location ($\alpha = .05$, $F = 9.446$, $p < 0.001$) (Figure 8 & Tables E8-E9 in Appendix E). Tukey's HSD Post-Hoc revealed significant difference between CEME and all other locations, with the greatest difference of $p < 0.001$ between CEME and BG. These results suggest opinions on the responsibility for biodiversity protection do have a relationship with the amount of biodiversity present in a location. In CEME, where there is no biodiversity present, participants feel less strongly that organizations and individuals other than National Parks should work on biodiversity conservation, as compared to participants from other locations where more biodiversity is present.

Finally, based on the client's request, we had investigated which type of sustainable project participants were most interested in. Table F1 (Appendix F) shows the frequencies of responses - 47% of all participants believed that UBC should focus on Alternative Energy Sources, Biodiversity was the second most frequently chosen response at 18.1%.

General Discussion

While our analyses produced mixed results, the totality of our One-way ANOVA and Pearson Chi Square analyses did not support hypothesis one - individuals in surroundings that are more abundant in biodiversity are likely to rate biodiversity and its conservation as more important. In addition, our observations of the campus heat maps, while showing some promise, did not support hypotheses two - individuals are more likely to locate biodiversity, on a map, closer to their current surroundings. It should be noted, however, that our hypotheses should not be ruled out completely. The reason for rejecting both of our hypotheses may have been due to confounding variables, which reflect possible underlying flaws in our methodology.

The first possible confound was the linguistic complexity of our questions. Many questions were presented in both the positive and negative form. While we properly reversed the questions during analysis to account for this, some participants may not have fully understood the question, which would have affected our data.

A second possible confound relates to conducting the surveys themselves. In general, most of our surveying was standardized to reduce surveyor bias and variability. However, inconsistent surveying times (different days of the week, different parts of the day, and only surveying during clear skies) may have introduced a confound that could very well be related to our hypotheses.

The third major confound was the heterogeneity of our participants. In BG, many participants were tourists or visitors to campus, as 60% of participants selected "Other" when asked about their role on campus. In addition, participants at BG were the only respondents to indicate their age as "65+" (7/20 participants did so). This could further be confounded by the different temporal and spatially distant opinions amongst older generations of people. These individuals may have witnessed more biodiversity loss within their lifetimes, and therefore may explain why participants at BG were in general more concerned about biodiversity conservation.

Furthermore, their opinions on biodiversity may not be representative of the UBC community due to their reduced knowledge of the campus. Likewise, in CEME, many of our participants were male (70% compared to 59% in total) and applied science majors (75% compared to 22.8% in total). Therefore, these results do not negate the possibility the differences were due to demographic confounds.

The fourth issue, which was a limitation of our study, were the lack of proper tools to objectively analyze the heat maps. Our group did not have access to information regarding the true amounts of biodiversity on campus, nor did we have the tools to analyze it. This opens up an area for further research, in using a computer program to analyze heat maps and compare the data to real measures of biodiversity in a particular geographical area. This would enable researchers to quantify the accuracy of participants' responses.

The implications for the crossroads of psychology and biodiversity are profound. First, our research illustrated biodiversity is a vague and convoluted concept for many people. There is the option to increase awareness of biodiversity in the community, and to educate them on its importance. During this process, there is a unique opportunity to research how effective awareness and education campaigns are with the UBC community. Using results from other SEEDS research relating to awareness campaigns, could be incorporated into this process. There are also implications for UBC administrators who aim to promote sustainability-related projects on campus, but before any initiative is undertaken, it would be prudent to determine whether or not there is support for our hypotheses. A first step in rectifying many of our confounds is giving the researcher more control over the research process. In particular, creating an experiment, whereby photos or virtual reality is used to manipulate the the level of biodiversity a participant sees, then assessing the participant's opinion on the importance of biodiversity and their spatial and temporal awareness of where biodiversity is located. Our hypotheses are still worth researching, but the methods in which they are researched can be improved with this future study.

Recommendations

The main recommendation we have for our client is to first increase UBC community members' awareness of biodiversity, and then to educate and gather their opinions on biodiversity conservation and the anthropological impacts. Given the finite amount of funding for sustainability-related projects at UBC, increasing concern for biodiversity in the community is a necessary first step in its conservation.

The other major recommendation we have is for UBC to pursue alternative energy source projects. From our data, it was evident this is the cause the community cares most about at this given point in time. In order for UBC to demonstrate that is takes community members' thoughts into account, acting on a high-valued initiative such as alternative energy sourcing would open opportunities for future community buy-in for subsequent initiatives such as biodiversity conservation. If UBC does want to place focus on biodiversity, targeting specific areas on campus where biodiversity appears to be of concern such as the biodiversity gardens, will help garner support for the projects. In areas, such as CEME, where biodiversity support is lower, we suggest the first step is to increase awareness.

References

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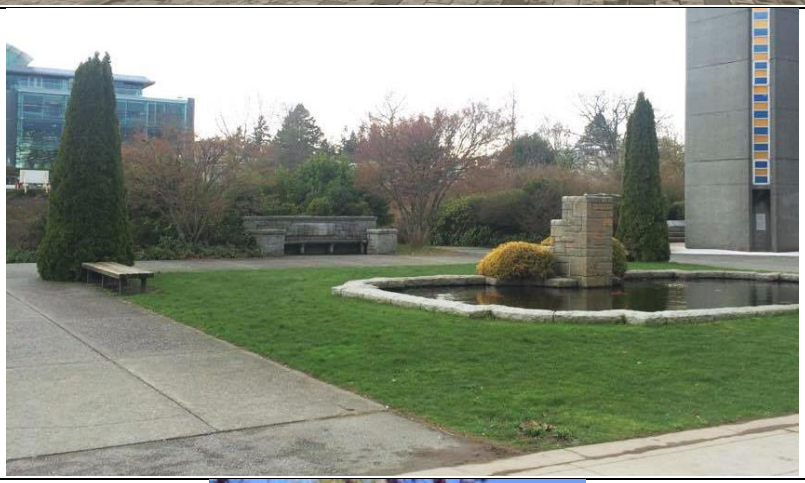
Appendix A

Independent Condition: Locations of Surveying

Degree of Biodiversity	Location	Image
1 (Low/None)	CEME (Civil and Mechanical Engineering) Basement	
2	EOSC (Earth and Ocean Sciences) West Entrance	

Appendix A

3	Martha Piper Plaza	
4	Library Gardens	
5 (High)	Botanical Gardens	

Appendix B

UBC Campus Survey on Biodiversity

1. Gender: _____
2. Age
    - 18-25 Years
    - 26-35 Years
    - 36-45 Years
    - 46-65 Years
    - 65 + Years

3. What is your role on campus?
    - Undergraduate Student
    - Graduate Student
    - Faculty
    - Staff
    - Other (specify): _____

4. Which Faculty do you belong to? Please circle.

Science Arts Commerce Applied Science Nursing Education Kinesiology Forestry Land and Food System Law Medicine Pharmaceutical Sciences Other (specify): _____

5. Where do you consider "home"?
    - B.C.
    - Elsewhere in Canada
    - International

6. What is your definition of biodiversity?

7. How do you feel about biodiversity?

8. Where do you believe biodiversity is located on campus? Colour in on the provided map.

9. In each of the following rows, please circle which organism you think is the most important to protect?

    Row 1: Barnacle , Bee , Beetle , Native Grass
    Row 2: Starfish , Fern , Squirrel , Crow
    Row 3: Salmon , Maple Tree , Raccoon , Heron
    Row 4: Otter , Cedar Tree, Deer , Eagle

Appendix B (Continued)

10. For the following statements please answer the degree to which you agree or disagree. There is no right or wrong answer. We are only interested in your honest opinions.

It is **not** important to me that areas of **forest** around campus are retained, rather than being developed for housing or other buildings.

Strongly Agree (5) --------- (4)---------(3)----------(2)----------(1) Strongly Disagree

We need to worry about the impact of human-built urban developments on **avian**-based animals.

Strongly Agree (5)-------- (4) --------(3)----------(2)----------(1) Strongly Disagree

We **do not** need to worry about the impact of human-built urban developments on **oceanic** organisms.

Strongly Agree (5) --------- (4)---------(3)----------(2)----------(1) Strongly Disagree

We need to worry about the impact of human-built urban developments on **plant** based organisms.

Strongly Agree (5)--------- (4) --------(3)--------(2)----------(1) Strongly Disagree

The choices that UBC makes about the types of **plants** that they put on campus has implications for the surrounding environment.

Strongly Agree (5) --------- (4) ---------(3) ----------(2) ----------(1) Strongly Disagree

We **do not** need to worry about the impact of human-built urban developments on **ground-based animals.**

Strongly Agree (5) --------- (4) ---------(3)----------(2) ----------(1) Strongly Disagree

The issues of biodiversity protection are only relevant to wilderness areas such as National Parks.

Strongly Agree (5) --------- (4) ---------(3)----------(2) ----------(1) Strongly Disagree

11. What steps to protect biodiversity should UBC take? Please name specific places, or actions?

Appendix B (Continued)

12. In your opinion, which of the following sustainable projects is it most important for UBC to spend money on? Please choose one.

    - Transportation
    - Food Sourcing
    - Biodiversity
    - Alternative energy sources
    - Building Design

Map for Question 8 (Map was full page)

Appendix C

Heat maps of Locations 1 through 5

Fig.1 Heat-map identifying where respondents (N=20) located at CEME (yellow dot on image) reported biodiversity on campus. Dark/bright pink areas represent most selected areas.

Fig.2 Heat-map identifying where respondents (N=3) located at EOSC (yellow dot on image) reported biodiversity on campus. Dark/bright pink areas represent most selected areas.

Appendix C (Continued)

Fig.3 Heat-map identifying where respondents (N=20) located at MP (yellow dot on image) reported biodiversity on campus. Dark/bright pink areas represent most selected areas.

Fig.4 Heat-map identifying where respondents (N=20) located at IKB (yellow dot on image) reported biodiversity on campus. Dark/bright pink areas represent most selected areas.

Appendix C (Continued)

Fig.5 Heat-map identifying where respondents (N=20) located at BG (yellow dot on image) reported biodiversity on campus. Dark/bright pink areas represent most selected areas.

Appendix D

$\mathbf{X^2}$ Analysis

Table D1
X^2 Test of Row 1 v. Location

	Value	df	Approximate Significance
Pearson Chi-Square	5.355[a]	9	.802[b]
Nominal by Nominal – Phi	.285		.802
Nominal by Nominal – Cramer's V	.164		.802
N of Valid Cases	66		
Notes: [a]12 cells have expected count less than 5. The minimum expected count is .45. [B] Asymptotic (2-sided) α =.05. No statistically significant results			

Table D2

X^2 Test of Row 2 v. Location

	Value	df	Approximate Significance
Pearson Chi-Square	12.920[a]	9	.166[b]
Nominal by Nominal – Phi	.439		.166
Nominal by Nominal – Cramer's V	.254		.166
N of Valid Cases	67		

Notes: [a] 8 cells have expected count less than 5. The minimum expected count is .90.
[B] Asymptotic (2-sided)
α =.05. No statistically significant results

Appendix D (Continued)

Table D3
X^2 Test of Row 3 v. Location

	Value	df	Approximate Significance
Pearson Chi-Square	4.628[a]	9	.865[b]
Nominal by Nominal – Phi	.439		.865
Nominal by Nominal – Cramer's V	.254		.865
N of Valid Cases	66		

Notes: [a] 11 cells have expected count less than 5. The minimum expected count is .45.
[B] Asymptotic (2-sided)
α =.05. No statistically significant results

Table D4
X^2 Test of Row 4 v. Location

	Value	df	Approximate Significance
Pearson Chi-Square	2.159[a]	9	.989[b]
Nominal by Nominal – Phi	.181		.989
Nominal by Nominal – Cramer's V	.104		.989
N of Valid Cases	66		

Notes: [a] 11 cells have expected count less than 5. The minimum expected count is 1.14
[B] Asymptotic (2-sided)
α =.05. No statistically significant results

Appendix E

One-Way ANOVA Analysis of Survey Part 4

Table E1
Opinion on human-impact on ground-based animals v. current location

	df	F	Sig. (p)
Between Groups	3	2.181	.097

Table E2
Opinion on human-impact on oceanic animals v. current location

	df	F	Sig. (p)
Between Groups	3	2.657	.054

Table E3
Opinion on human-impact on avian-based animals v. current location

	df	F	Sig. (p)
Between Groups	3	5.242	.002*

*Statistically significant result at α = .05

Table E4

Tukey HSD multiple comparison of opinion on human-impact on avian-based animals v. current location

Location (I)	Location (J)	Mean Difference (I-J)	Sig (p)
CEME	MP	-.750000	.103
	IKB	-.200000	.926
	BG	-1.150000*	**.004***
MP	CEME	.750000	.103
	MP	-.550000	.331
	BG	-.950000*	.606
IKB	CEME	.200000	.926
	MP	-.550000	.331
	BG	-.950000*	**.022***
BG	**CEME**	1.150000*	**.004***
	MP	.400000	.606
	IKB	.950000*	**.022***

*Statistically significant result at α = .05

Appendix E (Continued)

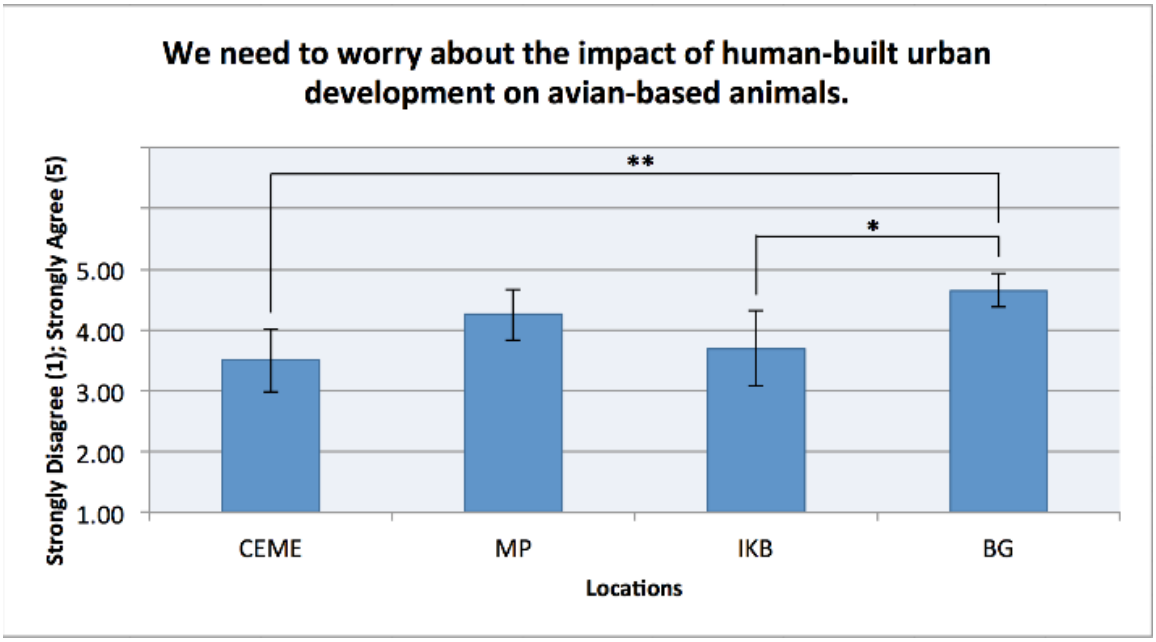


Figure 6. Average ratings of agreeability with the statement "we need to worry about the impact of human-built urban developments on avian-based animals" in each location, where (5) is Strongly Agree, and (1) is Strongly Disagree. Statistically significant difference between groups as determined by one-way ANOVA (F = 5.242, p = 0.002). Tukey post-hoc test revealed significance between **CEME (mean 3.5 +/- 0.51) and BG (Botanical Gardens) (mean 4.65 +/- 0.28) of p = 0.004, and between *IKB Gardens (mean 3.7 +/- 0.63) and BG of p = 0.022.

Table E5
Opinion on human-impact on plant-based organisms v. current location

	df	F	Sig. (p)
Between Groups	3	2.874	.042*

*Statistically significant result at α = .05

Appendix E (Continued)

Table E6
Tukey HSD multiple comparison of opinion on human-impact on plant-based organisms v. current location

Location (I)	Location (J)	Mean Difference (I-J)	Sig (p)
CEME	MP	-.700000	.197
	IKB	-.600000	.323
	BG	-1.000000*	**.028***
MP	CEME	.700000	.197
	MP	.100000	.992
	BG	-.300000	.827
IKB	CEME	.600000	.323
	MP	-.100000	.992
	BG	-.400000	.664
BG	**CEME**	1.000000*	**.028***
	MP	.300000	.827
	IKB	.400000	.664

*Statistically significant result at α = .05

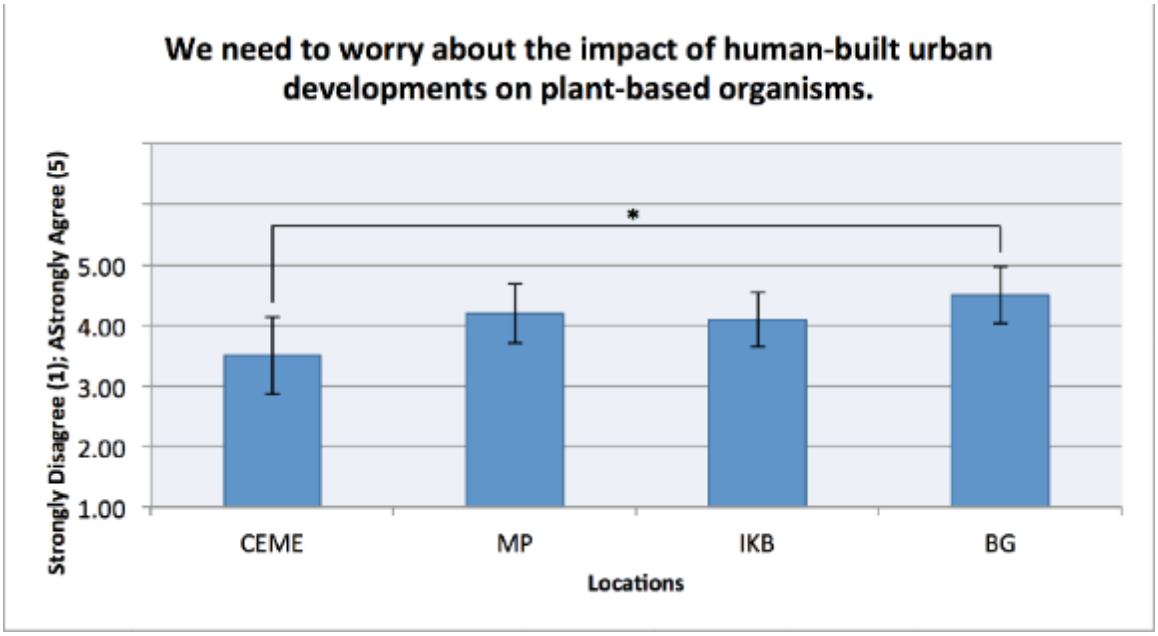


Figure 7. Average ratings of agreeability with the statement "we need to worry about the impact of human-built urban developments on plant-based animals" in each location, where (5) is Strongly Agree, and (1) is Strongly Disagree. Statistically significant difference between groups as determined by one-way ANOVA (F = 2.874, p = 0.042). Tukey post-hoc test revealed significance between CEME (mean 3.5 +/- 0.63) and BG (Botanical Gardens) (mean 4. 2 +/- 0.49) of p = 0.028.

Appendix E (Continued)

Table E7

Opinion on UBC's landscaping choices effect on environment. current location

	df	F	Sig. (p)
Between Groups	3	1.368	.259

Table E8

Opinion on whether biodiversity conservation is only responsibility of National Parks v. current location

	df	F	Sig. (p)
Between Groups	3	9.446	.000*

*Statistically significant result at α = .05

Table E9

Tukey HSD multiple comparison of opinion on human-impact on plant-based organisms v. current location

Location (I)	Location (J)	Mean Difference (I-J)	Sig (p)
CEME	**MP**	-.800000*	**.001***

	IKB	-.750000*	**.001***
	BG	-.950000*	**.000***
MP	**CEME**	.800000*	**.001***
	MP	.050000	.994
	BG	-.150000	.869
IKB	**CEME**	.750000*	**.001***
	MP	-.050000	.994
	BG	-.200000	.737
BG	**CEME**	.950000*	**.000***
	MP	.150000	.869
	IKB	.200000	.737

*Statistically significant result at α = .05

Appendix E (Continued)

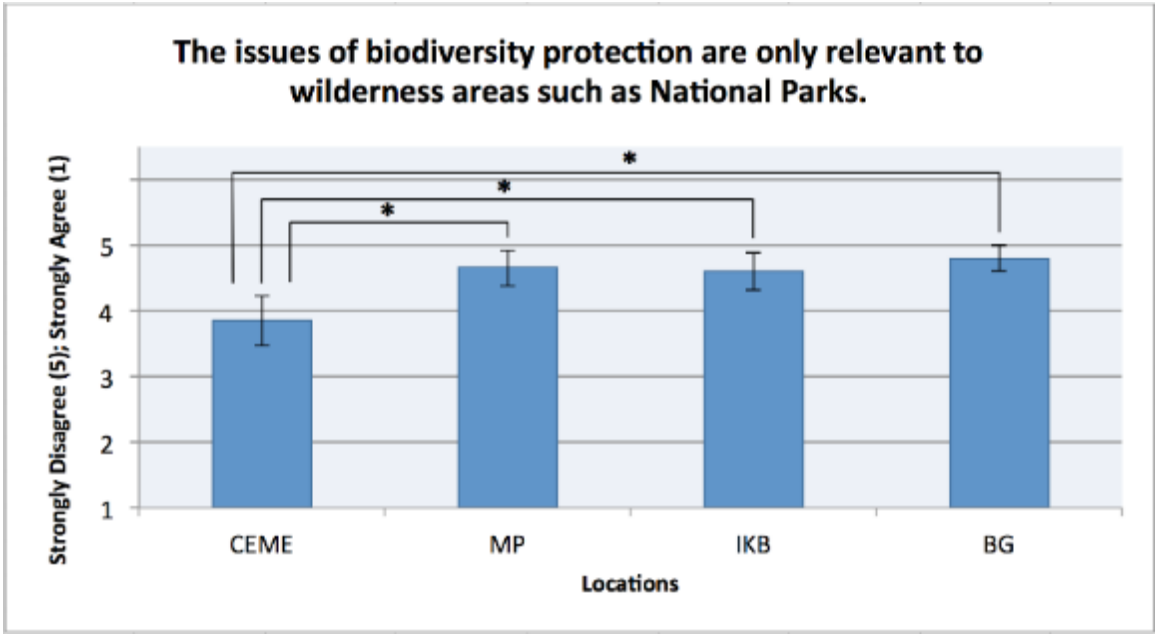


Figure 8. Average ratings of agreeability with the statement "the issues of biodiversity protection are only relevant to wilderness areas such as National Parks" in each location, where (1) is Strongly Agree, and (5) is Strongly Disagree. Statistically significant difference between groups as determined by one-way ANOVA ($F = 9.446$, $p < 0.001$). Tukey post-hoc test revealed significance between CEME (mean 3.85 +/- 0.38) and MP (Martha Piper Plaza) (mean 4.65 +/- 0.27) at $p = .001$, CEME and IKB Gardens (mean 4.6 +/- 0.28) at $p = .001$, CEME and BG (Botanical Gardens) (mean 4.8 +/- 0.19) at $p < 0.001$.

Appendix F

Table F1
Frequency Percent Table of Sustainable Project V. Location

Location	Transportation	Food Sourcing	Biodiversity	Alt. Energy Sources	Building Design	N
CEME	10%	5%	15%	60%	10%	20
EOSC	33.3%	0%	0%	0%	66.7%	3
MP	15%	10%	20%	50%	5%	20
IKB	10%	25%	10%	45%	10%	20
BG	20%	0%	30%	40%	5%	19
Total	14.5%	9.6%	18.1%	47%	9%	82

Appendix G

Delays in Assigning of Client

A major setback our group faced was the confusion around whom our client actually was. After contacting the original client via email, we found out he was no longer the individual to speak to. After exchanging multiple emails with the Professor, TA, and SEEDS Coordinator, we were finally assigned a person. However, even then, meeting with the client happened late in the process as we were only able to do so for 30 minutes in the class before the research proposal was due.

The delay reduced the amount of time we spent planning to conduct the research, which pushed the execution of our project back, thus effectively reducing the amount of time for us to survey and analyze the data.

If our group had more time with the client, and to gain a through understanding of what he wanted out of our research efforts, we would have been able to gather more usable information for him. The result was a survey in which we simply combined the client's wishes with that of our preexisting survey, without being able to fully integrate the two parts together.