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ATTITUDES TOWARDS BIOLOGICAL CONSERVATION OF ONE CLASS OF NATIONAL UNIVERSITY OF SINGAPORE UNDERGRADUATE STUDENTS

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ABSTRACT

As a small city state, with few natural areas remaining, biological conservation is important to Singapore. It is imperative for the government and conservationists to determine Singaporeans' attitudes and behaviours toward biological conservation and which demographic variables predict for conservation attitude in order to design and implement conservation policies in a more socially acceptable manner. A survey, of the undergraduate student class of 405 with 310 respondents (76.5%) but only 280 (69.1%) usable, was conducted on 21 Feb.2008 during a lecture of SSS 1207 (The Natural Heritage of Singapore) at the National University of Singapore (NUS). Data analyses revealed that students do not particularly prefer to conserve plant species, animal species or natural habitats over any other, and are also more likely to exhibit introverted conservation behaviours such as using conservation-friendly products rather than extroverted behaviours such as submitting a petition to a relevant government agency to take up conservation causes. Students from the higher and lower household income groups, who had enrolment in modules involving conservation, who have biological knowledge and who major in computing were more likely to have more pro-conservation attitudes.

INTRODUCTION

Despite land use constraints, the government of the Republic of Singapore has continued to emphasize environmental sustainability and the conservation of biodiversity via instruments such as the Green Plan 2012 which was enacted to preserve, protect and enhance the environment and water resources (Ministry of the Environment and Water Resources, 2006). It contains guidelines to meet various environmental objectives and also to highlight nature areas worthy of conservation and targets were made to maintain nature areas for as long as possible in order to conserve our biodiversity (Ministry of the Environment and Water Resources, 2006).

The key aim of biological conservation is to maintain the diversity of living organisms, their habitats and the inter-relationships between organisms and their environment (Spellerberg & Hardes, 1992). Biological conservation (hereafter, conservation) is important to Singapore for people to have meaningful contact with nature in the city (Kellert, 1996), as a natural heritage (Tan et al., 2007) and to distinguish itself from other Garden Cities. This is pressing in the urban landscape of Singapore, where only pockets of natural habitats remain.

On a parallel track, the new initiatives by the government coincide with the trend of increasing activism of Singaporeans in conservation, as seen from the increase in civil society participation. A landmark example occurred in 2001 when the environmental civil society, consisting of voluntary associations and citizens, persuaded the government to defer plans to reclaim Chek Jawa, a nature haven off the east coast of Pulau Ubin, Singapore (Tan, 2007).

Despite the preponderance of studies on the attitudes of people toward wildlife (e.g., Kellert, 1991; 1993a; 1993b), the conservation of specific species (e.g., Alexander, 2000; Bandara & Tisdell, 2003; Ericsson & Heberlein, 2003; Plieninger et al., 2004), ecosystems (e.g., Jacobson & Marynowski, 1997; Alessa et al., 2003) and environmental conservation (e.g., Dietz et al., 1998; Hunter, 2000; Walpole & Goodwin, 2001), there is a paucity of studies pertaining to attitudes toward biological conservation in general. Thus the aims of this preliminary study were to:

1. Develop a means to classify and measure the biological conservation attitudes of people.
2. Determine correlates of biological conservation attitudes.

We hope to develop a means to identify and quantify the attitudes of people, particularly Singaporeans, towards biological conservation. A survey of the conservation attitudes, behaviour, knowledge and motivations of the students was carried out through their responses to a questionnaire. Many studies showed that attitudes toward environmental concern are associated with gender, age, education, ethnicity, income and class (van Liere & Dunlap, 1980; Kanagy et al., 1994; Hunter, 2000). This study aims to study some of these factors but also others that are more applicable to

tertiary students such as the faculty of the student and the student's previous enrolment for modules that involved conservation topics.

The main hypotheses that we hoped to test were whether there exists a differing attitude toward plant species, animal species and the habitat as a whole, whether students were more prone to introverted rather than extroverted displays of conservation behaviour, whether students from the Science and, Arts and Social Sciences faculties would have greater biological concern than their counterparts in other faculties and whether a high household income was a predictor for a more positive conservation attitude, among others.

The advantages of a survey as compared to an interview would be the minimisation of the interviewer effect—a tendency of respondents to align their answers to the interviewer's expectations. It will also be easier to replicate the study and to compare results with other studies which used similar techniques (Nardi, 2006). To discourage dishonest responses, the survey was kept anonymous and conducted in the absence of a surveyor. As an exploratory research study and also owing to time constraints, our sample size was restricted to a group of undergraduate students from a local university.

METHODS

Subjects composed of 310 undergraduate students from various faculties enrolled in a National University of Singapore (NUS) module for Singapore Studies, the Natural Heritage of Singapore (SSS 1207), a 13-week course available for enrolment by all undergraduates except those from the Medicine, Dentistry and Law Schools.

A paper questionnaire consisting of 48 questions and requiring an average of 15 minutes to complete was designed to quantify the attitudes, behaviour and knowledge of students towards conservation (Appendix). The questionnaire was designed after analysis of the survey questions of related publications (Kellert, 1993a; Caro et al., 1994; Dietz et al., 1998; Hunter, 2000) and by creating questions that would assess the attitudes investigated. Subjects were asked to respond to the questions using a seven-point Likert Scale for the attitude, behaviour and motivation sections (Likert, 1932) during a lecture on 21 Feb.2008.

Data analysis was performed using SPSS 16.0 (SPSS Inc., USA) on a sample of 280, after 30 incompletely-filled forms were excluded. The questionnaire consisted of questions on general attitude, conservation behaviour, motivation for conservation, knowledge and demographic details. The first three were answered using the Likert Scale (1 to 7), the fourth consisted of true or false questions and the last consisted of given or respondent-decided categories (Appendix).

Measure of Conservation Attitude. – These questions (numbered 1 to 6 in the questionnaire) were designed to test whether students show differences in the way they value plant species, animal species or natural habitats. The response to each question was coded a score from one to seven — one being least pro-conservation and seven being most pro-conservation. Confirmatory factor analysis with Varimax Rotation was executed to determine this. Significant factors of eigenvalue greater than one were extracted. An index for the conservation attitude of each respondent was constructed by summing scores of the six attitude questions. The Cronbach's Alpha value (ranging from 0 to 1) is based on the average correlation of each item in the scale with every other item (Leech et al., 2008) and hence provided a measure of the consistency of a person's response of the items in a scale. Cronbach's Alpha value should be at least 0.7 to be considered reliable (de Vaus, 1996).

Measure of Conservation Behaviour. – Questions were design specifically to test for the public or extroverted (7, 10 and 12) and private or introverted (8, 9 and 11) displays of conservation behaviour. The response to each question was coded a score from one to seven—one being least pro-conservation and seven being most pro-conservation. Confirmatory factor and reliability analysis were likewise performed in the same manner as measuring conservation attitude.

Measure of Motivation for Conservation. – Questions 14 to 27 were intended to characterise the motives behind the above attitudes and behaviour. We divided the scale of Kellert (1991) for basic feelings and beliefs toward the natural

Table 1. Basic attitudes toward biological conservation.

Aesthetic	Inclination to conserve owing to the physical attractiveness of a habitat or species
Moralistic	Inclination to conserve to ensure right treatment to species
Scientistic	Inclination to conserve to ensure learning of physical attributes and biological functioning, taxonomic classification is possible
Ecologistic	Inclination to conserve to maintain interrelationships among species in a habitat
Utilitarian	Inclination to conserve for the material benefits of biological species and habitats

Table 2. Kellert's modified attitude scale questions.

Dimension	Kellert Scale	Question Nos.
Material	Utilitarian	14, 17, 20, 23, 26
Emotional	Moralistic, Aesthetic	15, 18, 21, 24, 27
Intellectual	Scientistic, Ecologistic	16, 19, 22, 25

world into three dimensions. The new scale consisted of the material (utilitarian), intellectual (scientistic/ecologistic) and emotional (moralistic/aesthetic) dimensions, the definitions (Kellert, 1993c) of which are presented in Table 1. Table 2 shows the questions pertaining to each scale. Values such as negativistic, humanistic and naturalistic were excluded as they were either not applicable to conservation or difficult to quantify. A negativistic attitude describes fear of nature, and is unlikely to motivate conservation. Naturalistic (love for the outdoors) and humanistic (love for large animals with anthropomorphic associations) were excluded in our scale to simplify it. The response to each question was coded a score from one to seven — one showing the least motivation of a specific type and seven showing the greatest motivation of a specific type. Both confirmatory factor and reliability analyses were performed to test whether peoples' attitudes could be so classified.

***Measure of Conservation Knowledge.* –** Ten true-false questions (29 to 38), which tested respondents' knowledge about the local conservation scene and conservation in general, were included. Students were given the option of "Don't Know" to lower the incidence of indiscriminate guesses and therefore maximize accuracy of the knowledge scale (Weisberg 2005). Each correctly answered question was given one mark and each incorrect answer, zero. Subsequently, a knowledge score for each student was computed by addition of the marks obtained in 10 questions.

***Obtaining Demographic Information.* –** Demographic questions (38 to 48) at the end of the survey were included to test for possible predictors (gender, course, nationality, ethnicity, religion, household income and enrolment in a module involving conservation) of conservation attitudes.

***Analysing Predictors of Conservation Attitude.* –** Relationships between demographic data and general conservation attitudes were tested by fitting main effects using the Generalized Linear Models (GLZ) application of SPSS 16.0. Knowledge, being a scale predictor, unlike the other factors which are categorical predictors, was regressed against general conservation attitude as a covariate using the GLZ. The GLZ has advantages over the t-test and analysis of variance (ANOVA) because it can be used to predict responses for dependent variables with non-Normal distributions and which do not relate linearly to the predictors (SPSS Inc., 2006). Using the GLZ we identified variables that were significant in predicting for general conservation attitude. The significant variables do not necessarily represent the most parsimonious model. However by considering the significant variables as a starting point, one can instead use the model selection and multi-model inference approach to determine the most parsimonious model (Burnham & Anderson, 2002).

RESULTS AND DISCUSSION

***Specific Attitudes toward Biological Conservation.* –** Data analysis revealed that students do not particularly prefer to conserve plant species, animal species or natural habitats, one over any other. Factor analysis yielded one extractable factor for the conservation attitude scale, meaning there is no significant difference between concern for plant species, animal species or natural habitat conservation. The results in Table 3 are contradictory to the findings of other studies.

Table 3. Average general conservation attitudes scores*.

Question No.	Question Content	Mean	Standard Deviation	Cronbach's Alpha
1	Concern for plant species	4.59	1.123	0.923
2	Concern for animal species	5.34	1.112	
3	Concern for natural habitats	5.32	1.144	
4	Plant species importance	4.84	1.22	
5	Animal species importance	5.36	1.152	
6	Natural habitats importance	5.43	1.137	
	Total aggregate score	30.89	5.95	

*One factor consisting of all six questions extracted by factor analysis.

People generally are more interested in conserving animal over plant species (Lindemann-Matthies, 2005). However, our results do not reflect this trend. Even though concern for plant species conservation yielded lower means, it was not significant enough to be extracted as a factor. The high Cronbach's Alpha value of 0.923 meant that there is high internal consistency between the interrelatedness of the questions. This could be owed to students having undergone prior lectures on the vegetation of Singapore in the module, resulting in greater awareness of plant species and their conservation.

We excluded Questions 13 and 28, which were intended to measure feelings toward conservation in relation to economic progress, from any analyses. This was because many students' answers to Question 28 were inconsistent to those from the other questions. Many did not realize that the response on the Likert Scale was to be reversed. Hence the two questions were not compatible with each other and did not reflect students' attitudes toward conservation in the light of economic progress.

***Motivations toward Biological Conservation.* –** Factor analysis conducted on the motivation questions (14 to 27) extracted three factors (Table 4), which differed from the modified Kellert's Scale categories (Table 2). Question 26 was negatively correlated to the mean response of all other questions in Factor 1. This suggested that most respondents failed to understand this question and had answered it in an opposite fashion. Upon inspection of Question 26, the structure of the sentence was found to be open towards both utilitarian and moralistic interpretations. Factor analysis was performed again on Questions 14 to 27, less 26 (Table 5). The questions designated to measure each respective motivation for conservation did not cluster together in the same factor. It

Table 4. Rotated matrix by Principal Component Analysis* with Question 26.

	Component		
Question No.	**1**	**2**	**3**
26	−0.822		
27	0.787		
21	0.713		
22	0.652		
25	0.456		
16	0.444		
19	0.281		
14		0.662	
23		0.652	
15		0.652	
18		0.584	
24		0.495	
20			0.799
17			0.789

*Rotation method: Varimax

Table 5. Rotated matrix by Principal Component Analysis* without Question 26.

	Component		
Question No.	**1**	**2**	**3**
22	0.735		
15	0.727		
27	0.727		
21	0.712		
25	0.693		
18	0.675		
19	0.584		
16	0.573		
20		0.781	
17		0.757	
23			0.776
24			0.562
14			0.549

*Rotation method: Varimax

Table 6. Average behavioural scores*.

Question No.		Mean	Standard. Deviation	Cronbach's Alpha
	Private			
8	Educate friends	4.4	1.431	0.802
9	Conservation-friendly products	4.95	1.581	
11	Educate family	4.4	1.576	
	Total aggregate score	13.76	3.887	
	Public			
7	Volunteer	3.75	1.457	0.76
10	Petition	3.27	1.634	
12	Forum letter	3.05	1.417	
	Total aggregate score	10.07	3.713	

*Two factors extracted by factor analysis. Factor 1 (renamed private) consists of Q8, 9, 11. Factor 2 (renamed public) consists of Questions 7, 10, 12.

can therefore be concluded that the questions were unable to measure the proposed latent motivations for conservation. There were no discernable commonality between questions clustered within each of the three newly-extracted factors and difference between each factor, therefore newly-interpreted scales could not be constructed.

***Behaviours Reflecting Biological Conservation.* –** Students were more likely to exhibit introverted behaviours (e.g., using conservation-friendly products) than extroverted behaviours (e.g., writing a letter to the forum section of a newspaper regarding conservation issues). Confirmatory factor analysis revealed that there were public and private conservation behavioural differences (Table 6). High Cronbach's Alpha values of more than 0.7 for both factors ascertained the reliability of the two scales.

Respondents tended to exhibit conservation behaviour privately rather than publicly. The sample consisted mainly of Asians (308 / 310 = 99.3%) of which 250 / 305 = 82.5% were Singaporeans. Hence, they might possess what scholars believe to be a set of "Asian Values" which include traits such as a communitarian sense, social harmony and deference to authority (Detenber et al., 2007; Han, 2007). Such non-Western cultures are characterized by the fundamental connectedness among human beings where the emphasis is on attending to others, fitting in and the harmonious interdependence within a group (Markus & Kitayama, 1991). Willnat et al., (2002) also stressed that outspokenness is regarded as a negative characteristic in certain cultures where verbal challenges were considered impolite. These could be the reasons why many students were less likely to exhibit behaviours that required outspokenness and expressed independence from others. They might also be less willing to go against the norm or the decisions of the governing authorities, preferring to do activities in line with their beliefs privately. The government should be aware of the potential implications of a predominantly Asian population and their greater tendency to exhibit private conservation behaviours to ensure that the conservation needs and opinions of the less vocal citizens' are also considered. This could be achieved through surveying a random sample of citizens for their views, instead of only interviewing the more outspoken citizens who have voiced their concerns directly to the government or the public.

***Predictors of a General Conservation Attitude.* –** Table 5 shows the correlations as measured by the B value for the various parameters using the GLZ. The significance of each candidate predictor variable is indicated by the significance or p-value as shown in Table 6. Results, as seen in Fig. 1, show that significant predictors of conservation attitudes are household income (Fig. 1A), previous enrolment of modules with a conservation component (Fig. 1B), knowledge on the topic (Table 6) and the faculty the student is in (Fig. 1C). We used the 0.05 level of significance as recommended for small samples (de Vaus, 1996).

Our results revealed that for this sample, gender (Fig. 2A), ethnicity (Fig. 2B), religion (Fig. 2C), and nationality (Fig. 2D) are not significant predictors of general conservation attitude (Table 6). Hence, they will not be discussed in detail in this report.

Many studies have shown that income is positively associated with environmental concern (Kellert, 1994; Pouta et al., 2000). One explanation for this finding is the upper and middle classes have had their basic needs met and are more liable to focus on the aesthetic aspects of life (Van Liere & Dunlap, 1980). Another explanation also given by Van Liere & Dunlap (1980) is that people with a higher income are more accustomed to pleasant living and recreational

Table 5. Generalized linear models parameter estimate of conservation attitudes.

Parameter	B (coefficient)	Standard Error
(Intercept)	31.988	4.653
Male	1.362	0.7734
Female	0[a]	
Science	0.21	1.4952
Arts	0.498	1.6988
Business	–3.988	2.3807
School of Design and Environment (SDE)	0.491	1.8076
School of Computing (SOC)	3.568	1.7125
Engineering	0[a]	
Non-Singaporean	–0.272	0.9172
Singaporean	0[a]	
Chinese	–4.007	2.6299
Malay	–6.946	4.1849
Indian	–3.873	4.6921
Others	0[a]	
Atheist	2.661	3.6327
Buddhist	0.967	3.2214
Hindu	1.782	4.7513
Muslim	1.92	3.3041
Christian	2.773	3.4581
Catholic	1.308	3.2507
Free thinker	–0.393	3.4703
Others	0[a]	
Less than $4000	0.178	0.9687
$4000 to 8000	–2.701	1.0237
More than $8000	0[a]	
Never taken other nature modules	–2.2	1.0237
Taken nature modules before	0[a]	
Knowledge	0.53	0.2129
(Scale)	29.119[b]	2.461

[a]Set to zero because this parameter is redundant.

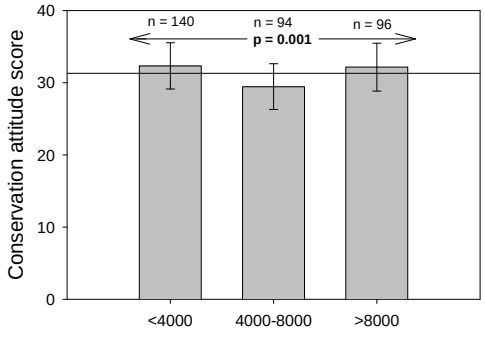
[b]Maximum likelihood estimate.

Table 6. Significance level of results.

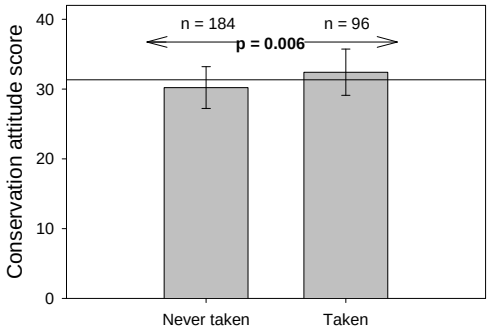
Variable	Degrees of Freedom	p-value
Income**	2	0.001
Module**	1	0.006
Knowledge*	1	0.013
Faculty*	5	0.027
Gender	1	0.79
Ethnicity	3	0.325
Religion	7	0.764
Nationality	1	0.766

Note: B value for knowledge is 0.530.

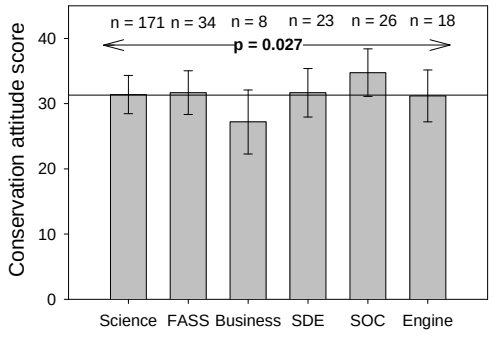
*$p < 0.05$; **$p < 0.01$



(A) Conservation attitude score by household income



(B) Conservation attitude score of students who have and have not taken modules with a conservation component before



(C) Conservation attitude score by faculty

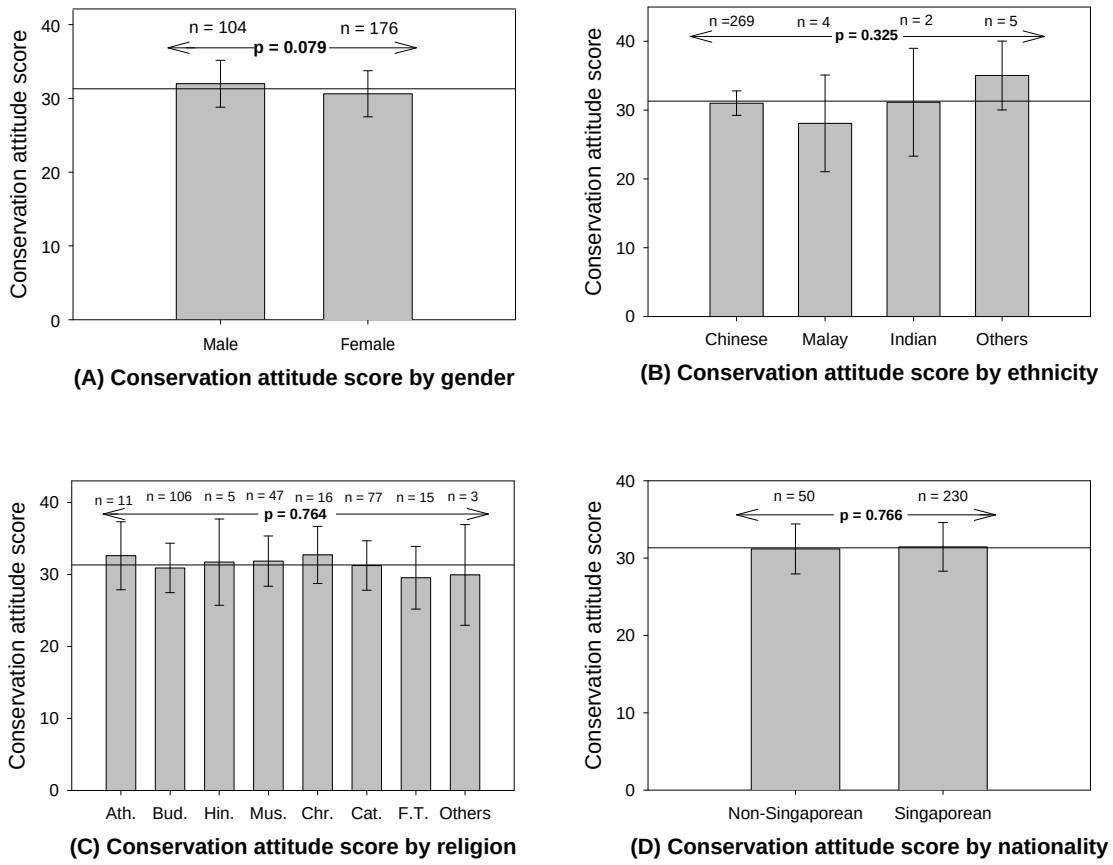
Legend:
The bars represent the marginal means.
The horizontal line represents the grand mean as predicted by GLZ.
The error bars show the 95% confidence interval.

Abbreviations:
FASS = Faculty of Arts and Social Sciences
SDE = School of Design and Environment
SOC = School of Computing
Engine = Faculty of Engineering

Fig. 1. Conservation attitude scores by household income, experience taking module with conservation component and by faculty ($p < 0.05$).

environments and would hence be more concerned with any deterioration of the environment, compared to the lower classes which have experienced only poor physical conditions. Our results in Fig. 1A, however, do not reflect this positive association, with students from both the lower and higher income groups scoring better in conservation attitudes. This conservation attitude of the lower income, as seen in our results, was hypothesized by Buttel & Flinn (1974) who speculated that people from the lower classes would be more familiar with poor environmental conditions and would therefore be more concerned about the environment. However, with regards to conservation, these class factors may not play that huge a role in Singapore as the living conditions are of an acceptable standard throughout the country and every citizen has an almost equal chance of visiting a park or a nature reserve for leisure. Another reason why the middle income groups might have a lower conservation attitude than the others, could be owed to the dynamic state of being in the middle income group, where there is avoidance of becoming a lower income earner and a striving to earn a higher income (Hattori et al., 2003). This might leave this group of people with less time to consider conservation issues. The middle class has been shown to be more politically inactive than other classes in many Asian countries (Hattori et al., 2003). Special efforts can be made to ensure that the middle classes are aware of the conservation issues in Singapore through specific targeting of this group in environmental campaigns to encourage greater interest and involvement in conservation. The grouping of the income ranges could also be reconsidered in the future to a more realistic representation of the socio-economic environment of Singapore, instead of the simplification into only three economic classes.

Students who have enrolled for other modules with a conservation component generally have higher conservation attitudes (Fig. 1B), yet we were unable to deduce any causal relationships. Students who were predisposed to conservation might have selected related modules to take or the enrolment in such modules might have caused them to develop positive attitudes toward biodiversity conservation. In order to determine whether conservation biology education has an effect on conservation attitudes, one must conduct a pre-education and post-education survey (Caro et al., 1994).



Abbreviations:
Ath. = Atheist
Bud. = Buddhist
Hin. = Hindu
Mus. = Muslim
Chr. = Christian
Cat. = Catholic
F.T. = Free thinker

Legend:
The bars represent the marginal means.
The horizontal line represents the grand mean as predicted by GLZ.
The error bars show the 95% confidence interval.

Fig. 2. Conservation attitude score by gender, ethnicity, religion and nationality ($p > 0.05$).

Closely related to the experience of enrolling for other conservation-themed modules, is one's level of biological knowledge concerning the local conservation scene and the awareness of wildlife in Singapore, regardless of the source. This has been shown in Table 5 to correlate positively with conservation attitude, meaning those who have higher knowledge scores also tend to have more concern for conservation. Other studies like those by van Liere & Dunlap (1980) and Kanagy et al. (1994) are in agreement with our results that environmental concern is positively related to educational level which is a coarse proxy of knowledge. This study has shown that at least for one class of students in NUS, education is an important factor in ascertaining one's exposure and attitude towards conservation issues. The government and conservationists can consider developing educational programmes to better equip people with the knowledge to make calculated and informed decisions on how and what to conserve. A suggestion is to include a course on conservation in the Secondary School curriculum to expose students to conservation issues at an early age. This would ensure that the population has a similar understanding as the government and other non-government organisations (NGOs) on conservation issues, reducing possible misunderstandings and conflict of interests between parties.

Figure 1C yields interesting results, for we see that Business students perform worse than their counterparts and students from the School of Computing perform better. We had hypothesized that Science, and Arts and Social Sciences students would perform better owing to their supposed exposure to topics such as environmental sustainability, biodiversity and ecological systems. However, no such results were observed. It is possible that owing to the nature of their course syllabus, Business students might be more concerned with the economics of development and disregard the conservation of nature as the biodiversity benefits are less tangible and direct. Computing students could have performed well owing to students having prior interest and/or a pro-conservation attitude, as these students may be more likely to select this module to begin with. To compare the conservation attitudes between students from various

faculties, a stratified random sampling of the undergraduate population is recommended. This enables comparison of equal sized groups even if the groups are of unequal size in the population, hence reducing the bias from unequal sampling. Alternatively, statistical weighting techniques could be used during data analysis to adjust for under- and over-represented groups (Nardi, 2006). However, it is important to note that such results are only reflective of this one class and not representative of the university and might be stochastic in nature.

CONCLUSIONS

Survey results show that for the respondents of the NUS undergraduate class of the module, The Natural Heritage of Singapore, SSS 1207 (academic year 2007/2008), students have no preference for the conservation of plant species, animal species or habitats over any other. They are also more likely to participate in introverted than extroverted conservation behaviours. Significant predictors of conservation concern are household income, experience from enrolment in modules involving conservation, biological knowledge and the faculty in which the student studies in. Students from the higher and lower household income groups, who had enrolment in modules involving conservation, who have biological knowledge and who are from the School of Computing were more likely to possess a more pro-conservation attitude.

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Appendix. Survey form questions.

(A) General conservation attitude questions

1. How would you describe your concern for plant species loss?
2. How would you describe your concern for animal species loss?
3. How would you describe your concern for natural habitat loss?
4. How important or unimportant to you is plant species conservation?
5. How important or unimportant to you is animal species conservation?
6. How important or unimportant to you is natural habitat conservation?

(B) Conservation behaviour questions

7. Volunteer with a local conservation-advocacy non-governmental organisation (NGO), e.g. Nature Society (Singapore); Singapore Environment Council.
8. Educate your friends about biological conservation.
9. Use only conservation-friendly products, e.g. dolphin-safe tuna; turtle-safe sardines.
10. Submit a petition to a relevant government agency to take up conservation causes.
11. Educate your family about biological conservation.
12. Write a letter to the forum section of a local newspaper advocating biological conservation.

(C) Motivations for conservation questions

13. We focus too much on economic progress and not enough about the conservation of natural habitats.
14. Tropical forests remaining in various countries should be conserved to find potential cures for human diseases.
15. Man has a moral obligation to conserve other biological species.
16. Natural habitats should be conserved so that we can continue to inventorise (i.e. collect, name and describe) previously undiscovered species of plants and animals.
17. Nature reserves in Singapore should be well protected so that the people can partake in recreational activities (e.g., hiking, jogging and bird-watching) in these areas.
18. Man has a moral obligation to conserve natural habitats.
19. To me, it is a pity if a species goes extinct even before a scientist discovers it.
20. I believe that the mangroves in Singapore should be protected for its potential to be a tourist attraction.
21. It is important to prevent human disruption to natural habitats in order to preserve its beauty.
22. We should inject resources into conserving natural habitats to gain knowledge on the ecology of our native species.
23. Biological species useful to mankind should be provided a larger budget for their conservation compared to less useful species.
24. It is important to conserve natural habitats to beautify the environment.
25. We should prevent species from going extinct because we have much to learn from them.
26. We should conserve all ecosystems even if they provide us with no benefits.
27. It is important to conserve all living things because they, like humans, have a right to live.
28. People worry too much about human progress harming the wildlife and their habitats in Singapore.

(D) Knowledge questions

29. There are more plant species in the Bukit Timah Nature Reserve than in all the USA.
30. Over hunting/trapping is the most important reason for species endangerment.
31. The rain tree (*Samanea saman*) is a native tree, i.e., originally found in Singapore before the arrival of humans.
32. The global extinction of a biological species is for all practical consideration irreversible.
33. The conservation of *Chek Jawa*, a species-rich area in *Pulau Ubin*, was initiated by the Singapore Government.
34. The presence of mature forest around a reservoir is important for the maintenance of water quality.
35. Singapore's national flower, *Vanda* Miss Joaquim, is not a naturally occurring orchid but a man-made hybrid.
36. The original forest type of Singapore is the tropical dry forest.
37. The parks in Singapore are managed by the Urban Redevelopment Authority (URA).
38. There are coral reefs in Singapore.

(E) Demographic questions

39. **Gender**: Male / Female
40. **Year of Study**: 1 / 2 / 3 / 4 / 5
41. **Course** (major and/or minor): _____
42. **Nationality**: _____
43. **Ethnicity**: Chinese / Malay / Indian / Others (Please specify:_____)
44. **Religion**: Atheist / Buddhist / Hindu / Muslim / Protestant Christian / Roman Catholic / Free Thinker / Others (Please specify:_____)
45. **Household income**: >10,000 / 8,000–10,000 / 6,000–8,000 / 4,000–6,000 / 2,000–4,000 / < 2,000
46. **No. of wage earners**:_____

47. **Total no. of persons in family**:_____
48. **Have you enrolled for a module that has a component on Singapore's natural environment?**

    (1) **SSA2215/GE2018** Biophysical Environment of Singapore

    (2) **GEK2001/SSA2202** Changing Landscapes of Singapore

    (3) **GE2221** Nature and Society

    (4) **GE3221** Ecological Systems

    (5) **GE3239** Environmental Sustainability

    (6) **SSS1207** Natural Heritage of Singapore

    (7) **LSM1103** Biodiversity

    (8) **LSM3251** Ecology and Environmental Processes

    (9) **GEK1522** Global Environment Issues

    (10) **Other modules with a component on Singapore's natural environment that you have enrolled for:**
    _____