University of Sussex

Public Perception and Determinants of Concern on the Conservation of Chinese White Dolphin in Hong Kong

Candidate number: 107987
Supervisor: Dr. David Ockwell
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ABSTRACT

Hong Kong has been faced with a dilemma created by concerns about the future availability of lands and the impact of coastal development on the population of the Chinese white dolphins. Recognizing the importance of public participation in environmental protection, this study has explored the overall level of concern Hong Kong people have for the conservation of Chinese white dolphin and identified factors that lead to differences in environmental concern. Findings from survey show that the public are generally concerned about the Chinese white dolphin and would even forgo economic development in favor of its conservation. While people who have participated in dolphin-watching activities are more aware of the severity of threats faced by the Chinese white dolphin, men, older and wealthier people are more inclined to prioritize economic development over conservation of the species. Based on the results, the study has suggested recommendations for developing strategic plans that would promote awareness and engender broad-based public participation in the protection of Hong Kong's ecosystem integrity.

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1. INTRODUCTION

Since the 1980s, biodiversity loss due to human activities has been increasingly a matter of great concern among conservation scientists. However, despite the adoption of the Convention on Biological Diversity in 1992 which has been ratified by 196 countries, the global dedication to reversing this trend is generally lacking. By 2050, 66% of the world population will be living in urban areas (UN, 2014). As more developed space are needed to accommodate the expanding urban population, conflicts regarding land use and native species conservation will become increasingly common. The inherent environmental challenges within development has been a major hurdle for land managers to set priorities as they are increasingly faced with land users guided by distinctive perspectives toward human-environment relations. As Inglehart (1995) remarked, when environmental issues become associated with economic tradeoffs and people are forced to make difficult choices, environmental protection becomes a political issue. "Engaging with the local “voice” within this political agenda setting may [therefore] improve policy makers’ ability to respond to the essential issues” (Bi et al. 2010).

The importance of public participation in sustainable development, especially with regard to environmental issues, has been consistently emphasized by international agendas, for example the Rio Declaration (1992, pt. 10), the Johannesburg Declaration (2002, pt.26) and the Rio+20 Declaration (2012, II, C). With regard to biodiversity, it’s been recognized that “[c]itizens can be a driving force to push the biodiversity agenda in cities, both for policy-making and implementation. Civil society can induce governments to introduce coherent policies and also participate actively in the policy process as individuals or collective whole.” (Puppim De Oliveira et al. 2010) The key to unlocking this potential of the public as a green force thus lies in the fostering of public concern for the environment, which would require a good grasp of the factors and processes that influence perceptions of environmental issues. The initiation of a broad-based participation in policy formulation, decision-making and implementation, as well as a thorough understanding of how citizens consider and frame environmental issues

are thus instrumental in shaping environmental policy/governance and can be the starting point to improve wildlife-people relationship.

In 2011 the Convention on Biological Diversity (CBD) was officially extended to Hong Kong, signifying a formal commitment by the government to protect the city's rich variety of flora, fauna and natural habitats. Faced with the rapidly growing population pressure and demand to bring about long-term economic development, Hong Kong has inevitably adopted a developmentalist ideology that more often than not goes against its pledge to tackle the challenge of biodiversity loss. From here, we will explore public environmental concern and its relevancy in effective environmental protection and policymaking in the context of Hong Kong and one of its local species, the Chinese white dolphin.

1.1. Background and Context

Hong Kong has a total land mass of 1104 square kilometers and only less than 25% of which have been developed, since over 60% of total land area are made up of extremely varied hilly terrains, which are highly difficult to be built on (GovHK, 2013; Lai et al, 2012). With an expanding population of 7.155 million recorded in 2012, Hong Kong has a staggering population density of 6620 persons per square kilometer, making it one of the most densely populated areas in the world (GovHK, 2013).

To cope with the increasing land pressure and ensure continuous social and economic development, the Hong Kong government started a whole range of large-scale land reclamation projects from as early as the colonial era in the 19th century (Cheng et al, 2010), turning the once fishing village into a prosperous financial city. However, some of the projects, such as the reclamation for the Hong Kong International Airport in the 1990s and the ongoing construction of the Hong Kong-Zhuhai-Macau Bridge, have hugely disrupted the Chinese white dolphin population inhabiting the western waters of Hong Kong. As a result of direct habitat loss and degradation, the number of dolphin abundance has dwindled from 158 in 2003 to only 61 in 2012 (WWF, 2013).

Chinese white dolphin, also known as the Indo-Pacific humpback dolphin or Sousa chinensis, are native to the Pearl River estuary. Located at the mouth of the Pearl River, Lantau Island is the largest island in Hong Kong, and it is in the shallow coastal waters surrounding the island that a small portion of the Chinese white dolphin population are regularly found year-round (WWF, 2014a). Affectionately known as the pink dolphin by the locals, the official mascot during the handover of the former British colony to China in 1997 is not only a treasure of Hong Kong's natural heritage, it has also allowed for the generation of revenue from dolphin-watching tourism. Although the Chinese white dolphins hold enormous socio-economic values to Hong Kong, their protection status in the world city is far from ample. Listed as "Near Threatened" by the IUCN Red List of Threatened Species (Reeves et al. 2013), the resident population is protected locally under the Wild Animals Protection Ordinance and the Protection of Endangered Species of Animals and Plant Ordinance. The Sha Chau and Lung Kwu Chau Marine Park has also been designated as a dolphin sanctuary to protect only one of the animal's many important habitats (WWF, 2014b).

Despite increased evidence that the significant reduction in the number of Chinese white dolphin population is directly related to the intensive coastal infrastructure development (Hung, S.K.Y., 2013), the Hong Kong government has failed to set up a comprehensive and effective scheme to mitigate these threats to the animals. Instead, with policies generally in favor of development, the government has recently approved yet anther extensive engineering project to build a third runway at the Hong Kong International Airport, which would require a further reclamation of 650 hectares from the habitat of the Chinese white dolphins (WWF, 2014a). In face of the array of coastal development plans that are driving the animals in deeper perils, considerable oppositions have been voiced pledging the government not to downplay the seriousness of environmental degradation, indicating that the government's pro-development ideology does not necessarily represent all its citizens. To bridge the gap between what the government does and what citizens actually want, attempts to understand how the public perceive and evaluate environmental issues thus provide a good starting point, thereby enabling policy makers to effectively take into account the desires of the common Hongkongers

in making the right choices for the development of Hong Kong and the preservation of its surrounding ecosystems.

1.2. Research aims and objectives

The study aims to demonstrate how a close inspection of public perceptions on environmental issues adds insights to the management of environmental conservation and economic development initiatives, looking specifically at the case of the Chinese white dolphins in Hong Kong. The objective of the study is to determine individual differences, according to various positional factors (i.e. gender, age, education level and income level), level of subject familiarity and environmental value orientation, in people's perceptions towards the conservation of the animals (Figure 1). Based on the findings, I hope to suggest recommendations for improving environmental education and public awareness campaigns in order for NGOs to better communicate to the public and garner more support for the protection of Hong Kong's ecosystem integrity.

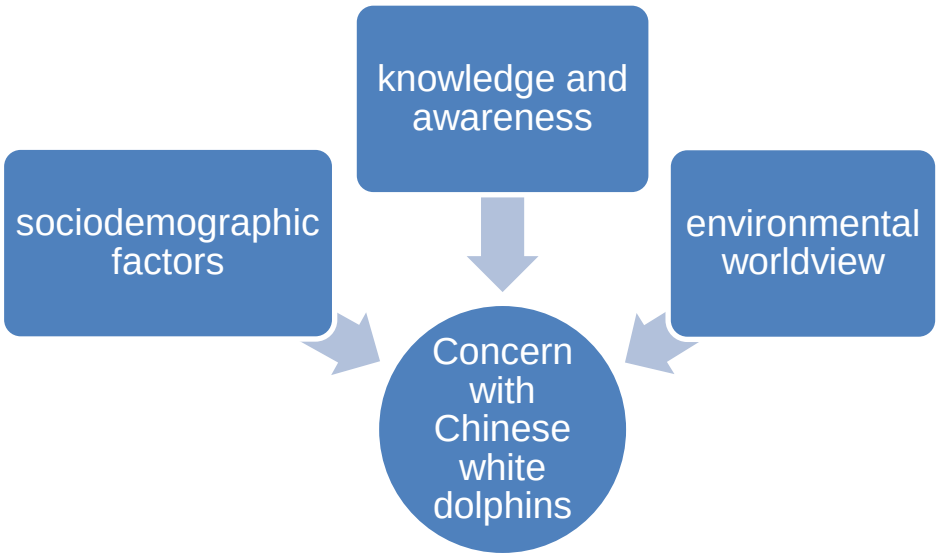

Figure 1. Hypothesized determinants of perceptions towards conservation of Chinese white dolphins

Major research questions

- How do people perceive the seriousness of the threats faced by Chinese white dolphins?
- How do people view the needs for urban development against the conservation of Chinese white dolphins?
- What factors influence the above perceptions?

Other questions

- How important are the demographics of the Hong Kong public in explaining their perceptions towards the conservation of Chinese white dolphins?
- How much knowledge does the public possess with regard to the Chinese white dolphin? How does their level of knowledge possession correspond to their perception towards the conservation of Chinese white dolphins?
- Are dolphin-watching activities useful in educating the public or promoting awareness regarding the conservation of Chinese white dolphins?
- How do people value the environment? How do their value priorities translate into their stance on the conservation of Chinese white dolphins?

Hypothesis:

1. There is no significant relationship between perception of seriousness of threats faced by Chinese white dolphin and conservation/development priority.
2. Levels of perceived seriousness of threats faced by Chinese white dolphin do not differ significantly between socio-demographic factors/levels of subject familiarity/environmental value orientations.
3. Conservation/development priorities do not differ significantly between socio-demographic factors/levels of subject familiarity/environmental value orientations.

2. LITERATURE REVIEW

2.1. Environmental concern

Described as “a broad concept that refers to a wide range of phenomena – from awareness of environmental problems to support for environmental protection – that reflect attitudes, related cognitions, and behavioral intentions toward the environment” (Dunlap and Jones, 2002, p.484), environmental concern is a construct consisting of two conceptual components: ‘environmental topics’ and ‘expressions of concern’. The environmental component can be a particular environmental problem or a set of environmental issues altogether in a broader sense, whereas the concern component is "the particular manner employed by the researcher to elicit people’s expression of concern about environmental issues” (Dunlap and Jones, 2003, p.365). A large variety of conceptualizations of the concern component has sprouted across a large body of literature over the last several decades, but they have been altogether misleading and inconsistent that studies on environmental concern are ususally ad hoc and atheoretical (Dunlap and Jones, 2002, p.482; Xiao and Dunlap, 2007; Liu et al. 2014). To clarify the meaning of environmental concern, Dunlap and Jones (2002, p.485) proposed the following definition: “environmental concern refers to the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution.” The definition implies that environmental concern “can easily encompass measures of behavior, knowledge, beliefs and values, as well as of attitudes” (Árnason, 2005). The inclusiveness of environmental concern as a concept thus renders necessary a multidimensional approach to its measurement. Past studies have measured environmental concern as perceived seriousness of environmental problems, environment/economic trade-offs, pro-environmental attitudes or an ecological world view, or participation in pro-environmental activities. In order to reduce conceptual confusion and effectively measure environmental concern, it is important to first select and define what particular

aspect(s) one wishes to focus on, according to Dunlap and Jones (2002). Hence, my study adopted a ‘single topic/multiple expression’ assessment strategy that measures both the perceived seriousness of threats faced by Chinese white dolphin and perception of tradeoff between economic development and conservation of the animal.

In the literature of environmental concern research, studies largely consist of efforts to explain environmental concern as a function of various socio-demographic factors and social psychological constructs (Dietz et al. 1998). However there are only few that cover a specific environmental issues (Van Liere and Dunlap, 1981; Klineberg et al. 1998; Bord et al. 2000) or examine environmental concern specifically in relation to developmental concern, i.e. economic/environment tradeoffs (Brechin and Kempton, 1994; Klineberg et al. 1998; White and Hunter, 2009). Even fewer are those that study environmental concern towards a specific wildlife species (Hill, 1998; Bandara and Tisdell, 2003). By addressing the above gaps in the research literature, I hope this study will contribute to greater understanding on both the conceptualization and measurement of environmental concern.

2.2. Sociodemographic determinants of environmental concern

What is known from the vast literature of environmental concern research is that the public is concerned about the environment but that some social groups are more concerned than the others. Liu et al. (2014) provided a comprehensive overview of the existing knowledge from a wide range of literature regarding the correlations between different social and demographic variables and environmental concerns. Women, the young, those with higher education and those with higher income tend to report higher levels of environmental concern. The following summarizes the different theories on the reported relationships between the various demographic attributes and environmental concern.

Gender: Research on the relationship between gender and environmental concern have consistently found that women are moderately more concerned with the environment

than men (Blocker and Eckberg, 1989; Bord and O'Connor, 1997; Uyeki and Holland, 2000; Lai and Tao, 2003; Biel and Nilsson, 2005; McCright and Xiao, 2014; McCright and Sundström, 2014). Studies have also found that the greatest gender differences in environmental concern could be seen in local environmental problems that clearly pose health and safety risks to families and communities (Mohai, 1992; Klineberg et al. 1998). According to Liu et al. (2014), there are three prevailing explanations of the gender gap on environmental concern. The first explanation, based on the 'gender socialization' arguments, suggests that the differences in gender may be caused by different expectations for females and males during childhood socialization processes (McStay and Dunlap, 1983; Hamilton, 1985; Blocker and Eckberg, 1989; Zelezny et al., 2000). The second explanation, based on the 'gendered social roles' argument, focuses on the gender-based divisions in both the labor market and home (Greenbaum, 1995; Blocker and Eckberg, 1997). The third explanation proposes the gender gap as a function of different value formation processes between women and men (Stern et al., 1995). While these theoretical explanations have received considerable attention, they enjoy relatively little empirical support (McCright and Sundström, 2014). More research that situate the gender gap in environmental concern in these arguments are needed to provide a clearer picture of their relationship.

Age: Past studies have found that young people are generally more concerned with the environment than older people (Arcury and Christianson, 1990; Van Liere and Dunlap, 1980; Howell and Laska, 1992; Dunlap and Jones, 1992; Kanagy et al., 1994; Martinsons et al. 1997; Dietz et al., 1998; Riechard and Peterson, 1998; Connell et al. 1999). Van Liere and Dunlap (1980, p.183) suggested that the age difference in environmental concern may be due to the fact that "young people are less integrated into… the dominant social order" and since "solutions to environmental problems often are viewed as threatening to existing social order", the younger generation are more supportive to environmental reform and acceptant to pro-environmental ideologies. Furthermore, Malkis and Grasmick (1977) argued that because young people are continually exposed to alarming information on environmental deterioration starting from a younger age than the older adults, it has left a more substantive imprint on them,

forming a more “ecology-minded generation whose commitment to environmental reform should not disappear as they move into adulthood.” (Van Liere and Dunlap, 1980, p.183)

Education and income: Social class status, as indicated by education and income, is found to be positively related to environmental concern (Van Liere and Dunlap, 1980; Arcury and Christianson, 1990; Howell and Laska, 1992; Jones and Dunlap, 1992; Kanagy et al. 1994; Elliott et al. 1997; Dietz et al. 1998). Rested on the hierarchy of needs theory (Maslow, 1970), one of the explanation, as to why people with higher social class tend to express greater level of environmental concern, proposes that higher-level concerns, such as concern for environmental quality, would only be held once basic material needs are met. Similarly, according to post-materialist theory, when posited as involving costs, i.e. an economic tradeoff, people with lower income may express less concern towards environmental issues relative to other social and economic concerns. Another explanation focuses on the ability of the higher social class to assimilate environmental information and analyze the true conditions of environmental issues (Liu et al. 2014). Several studies (Buttel and Flinn, 1978; Neiman & Loveridge, 1981; Martinez-Alier, 1995) have however proposed a counterhypothesis, arguing that because people with lower social class disproportionately experience the cost of environmental degradation, since they typically live and work in highly polluted environments, they should be expected to express more environmental concern than the others.

Despite the vast amount of literature dedicated to examine the relationship between socio-economic variables and environmental concern, it has been found that such correlations are generally weak and limited to effectively explain variations in environmental concern. In view of this, it has been suggested that in order to achieve a better understanding of the effects of demographic factors to environmental concern, researchers should adopt a more precise conceptualization of environmental concern by focusing on “concrete and specific” (Wall, 1995) environmental issues and paying more attention to the “tradeoffs involved in improving and protecting environmental quality” (Van Liere and Dunlap, 1980).

2.3. Level of subject familiarity and environmental concern

Arcury's (1990) paper assesses the relationship between environmental knowledge and environmental attitudes based on the assumption that positive attitudes towards the environment will increase with knowledge. It is, however, found that the association between the two is not strong. This finding corresponds with most other studies (Schahn and Holzer, 1990; Dunlap 1998; Hayes, 2001; Levine and Strube, 2012), suggesting that a highly informed population does not necessarily profess high level of environmental concern, or that environmental concern is not necessarily grounded in a clear understanding of the environment and its different issues.

Zeppel and Muloin (2008) found that close personal marine wildlife encounter contributes significantly to pro-environmental attitudes. Empirical studies of wild cetacean tourism have derived findings that suggest participating in cetacean tours with a strong educational focus and conservation program often leads to greater concern for marine mammals and conservation (Birtles et al. 2002; Wilson and Tisdell, 2003; Mayes et al. 2004). It is however important to note that little is known about the long-term effect of marine wildlife tours have on visitors' concerns since most surveys were done on-site immediately after the programs (Packer et al. 2010). More studies are thus needed in order to gain an understanding of how or if the benefits would sustain over time after the experience of encountering wildlife.

2.4. Value orientations and environmental concern

According to Stern and Dietz (1994), people construct their attitudes towards an environmental issue based on their expectations of how it affects the particular set of objects they value. In other words, values serve as criteria "for guiding action [and] for developing and maintaining attitudes toward relevant objects and situations'' (Rokeach, 1968, p. 160). Based on the Schwartz Theory of Basic Values, values are organized along two bipolar dimensions. The first dimension, 'openness to change vs conservation', captures the conflict between values that emphasize independence and

values that emphasize obedience, whereas the second dimension, ‘self-transcendence vs self-enhancement’, captures the conflict between values that emphasize concern for the welfare of the others and values that emphasize the pursuit of one’s own interests (Schwartz, 2012). The Schwartz value survey (SVS) and the Portrait Values Questionnaire (PVQ) have been developed to measure values based on the theory and have both gained widespread empirical support from many different cultures.

It has been empirically validated that values play a significant role in forming environmental attitudes (Ojea and Loureiro, 2007; Groot and Steg, 2008). A three-factor model, comprising egoistic (concern for the self), altruistic (concern for other people) and biospheric (concern for the non-human), has been identified to provide bases for environmental concern (Stern and Dietz, 1994). It has been proposed that all three value types promote pro-environmental beliefs, norms and bahaviors, but studies have generally found that biospheric value orientation plays a more important role in encouraging these concern because of its emphasis on the intrinsic value of nature and the environment, whereas altruistic and egoistic value orientations demonstrate a weaker correlation with pro-environmental concern because of their anthropocentric emphasis (Karp, 1996; Stern et al. 1998; Nilsson et al. 2004; Steg et al.2005; De Groot & Steg, 2008, 2010; Steg et al. 2011). On the relation between value orientations and biodiversity specifically, it could then be hypothesized that those who subscribe to egoistic and altruistic values tend to express less concern to wildlife decline when costs (e.g. increased income or reduced poverty from economic development) outweigh the personal or societal benefits associated with conservation (e.g. recreational opportunities and psychological wellbeing), while those who subscribe to biospheric values tend to express greater environmental concern when high environmental benefits are associated with conservation (e.g. ecosystem health).

3. METHODOLOGY

3.1. Sample and Questionnaire

Convenience sampling was used in this study and data were collected through a supervised self-administered questionnaire survey, which was conducted during the annual book fair that was held from 16-22 July 2014. The target population was defined as any Hong Kong citizen aged 15 and over. A pilot study was carried out beforehand on a sample of 10 people to test the draft questionnaire and to ensure it was easily understood by respondents.

The questionnaire was divided into 4 sections and was typed out in Chinese since Chinese speakers (both Cantonese and Putonghua) make up of 90% of Hong Kong's population (GovHK, 2013). All questions were closed-ended, where the respondents chose the most appropriate answer from a number of options, so that answers could be analyzed directly after they have been translated into a numerical scale. In the first part respondents were asked to rate the seriousness of the threats faced by Chinese white dolphins and then answer a trade-off question by choosing either economic growth or the conservation of Chinese white dolphin. According to Guber (2002, p.45), a combination of these questions places respondents in a position where they are forced to think about how important the problems are, and also consider the real costs associated with each of these conflicting goals, thus allows me to gauge meaningful public attitude strength towards the conservation of Chinese white dolphin. The second part is a knowledge test where six Chinese white dolphin-related questions are set up in an order according to their difficulty levels, i.e. from the easiest to the hardest, to directly measure respondents' knowledge of the subject. The third part contains a short version of Schwartz's value scale adapted from Groot and Steg (2007), which consists of 12 value items and respondents were asked to rate each of these items on a scale of 0 to 8 according to how important they are for them as a guiding life principle. The original Schwartz's value scale contains 56 value items, but since we were only interested in values that are related to environmental concern, the value scale used in

this study has been cut short to include only value items belonging to the 'self-transcendence versus self-enhancement' dimension of Schwartz's value theory (Stern et al. 1998). The last part includes questions that are used to create a socio-demographic profile of each respondent and finishes by asking if the respondent has participated in any local dolphin-watching activities.

As discussed in the literature review, prior research has identified a number of demographic factors that are commonly used as predictors of environmental concern. The *sex* of the respondent is a dichotomous variable (female = 1, males = 0). The *age* of the respondent was initially categorized into 5 groups: 15-24, 25-34, 35-49, 50-64 and >64. Given that only 2% of the sample was >64, the age variable was regrouped as: 15-24, 25-34, 35-49 and >50. *Education* was coded to differentiate between those attended university versus those did not (attended university = 1, never = 0). Respondents were asked to report their *household income* in one of three categories: less than $20,000; $20–$60,000; and $60,000 or more. Other factors have also been included in addition to the above positional variables. *Knowledge* is the only variable that is measured on a continuous scale: 0-6, according to how many questions the respondents were able to answer correctly in the knowledge test section of the questionnaire. *Dolphin-watching* was determined by whether or not respondents have participated in dolphin-watching activities (yes = 1, no = 0). *Value orientation* is a categorical variable that initially categorized respondents into three groups: egoistic, altruistic and biospheric values, but since there was only one sample that belongs to the egoistic value orientation, the egoistic value group had to be dropped from statistical analysis. Lastly, environmental concern is represented by two variables: *perceived seriousness* and *conservation/development priority*. The former is determined by a 4-point likert scale, ranging from not at all serious to very serious, with an additional "I don't know" option, while the latter is a dichotomous variable (conservation=1, development=0). Table 1 contains a list of these variables and their description.

Table 1. Variables and their measurement scale

Variables	Description	Measurement scale
Perceived seriousness	the perceived seriousness of threats faced by CWD	4-point Likert + "don't know" option
Conservation/Development	Prioritization between CWD conservation and economic development	Dichotomous
Knowledge	Number of correct answers concerning the CWD	Continuous
Value orientation	The Schwartz Value Scale	Categorical
Gender	-	Dichotomous
Age	Number of years since birth	Categorical
Education	Highest academic achievement	Categorical
Household income	Total monthly household income	Categorical
Dolphin-watching	Dolphin-watching experience	Dichotomous

3.2. Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS version 22.0, SPSS Inc, Chicago, IL, USA). A descriptive analysis was applied to the collected data to explore the sample's demographic profile and overall environmental concern. A series of univariate analyses (Mann-Whitney U-test, Kruskal-Wallis test, Chi-square test and Fisher's exact test) was performed to determine if there are association between perceived seriousness of threats faced by Chinese white dolphin and conservation/development priority, as well as differences in perceived seriousness and conservation/development priority according to gender, age, income, education level, and value orientations. Post-hoc analyses for Chi-square test and Fisher's exact test were run to determine where the differences lie and to verify the directions of significant relationships. Standardised residuals beyond ± 1.96 indicate a significant deviation from the expected values. Spearman's rank correlation and point-biserial correlation were used to study the association between knowledge level and perceived seriousness, and between knowledge level and conservation/development priority respectively. A p-value of less than 0.05 was considered as statistically significant.

4. RESULTS AND ANALYSIS

4.1. Sample demographics

A total of 81 respondents participated in the survey. Table 2 presents a summary of sample demographics. Sample is fairly evenly distributed across different demographic variables, although based on the 2014 census data (GovHK, 2015), there is an overrepresentation of the 15-24 age group, $20,001-60,000 income group and those who had attained post-secondary education. Those who studied up to high school and belong to the less than $20,000 income group are also underrepresented in the survey sample. These sample biases were introduced from the non-probability sampling method used in this study (i.e. convenience sampling) and could be explained by the demographics of visitors to the annual book fair where the majority of sample data were collected. The event is mostly visited by those who are younger, more highly educated and those who have more disposable income. Sampling biases could have adverse effects on the accuracy and validity of results, caution should therefore be exercised when generalizing the following findings to populations.

Table 2. Demographic profile of respondents (n=81)

Demographic variables	Percentage (%)	Demographic variables	%
Gender		*Education*	
Male	46.9	Up to high school	33.3
Female	53.1	Bachelors or above	66.7
Age		*Household income*	
15-24	32.1	Less than $20,000	29.6
25-34	21	$20,001-$60,000	53.1
35-49	22.2	More than $60,000	17.3
>50	24.7		

4.2. Results

Overall concern for Chinese white dolphin

Respondents were asked about the seriousness of threats faced by Chinese white dolphin and to prioritize between conservation of the Chinese white dolphin and economic development. The frequency distributions of the two aspects of environmental concern are shown in Table 3. A majority of the respondents (87.7%) perceived the threats faced by Chinese white dolphin as moderately serious or very serious, compared to only 4 respondents (4.9%) who perceive the threats as not very serious. None of the respondents chose the option for ‘not at all serious’ and 6 respondents (7.4%) chose the option for ‘I don’t know’. It is important to note that all ‘I don’t know’ responses were treated as missing data and were excluded from all ensuing statistical analyses, since they indicate that the respondents simply do not know the answer to the question, which render them irrelevant to further analysis. When asked to choose between the two statements, a majority of the respondents (80.2%) chose the first statement (i.e. conservation should be given priority) compared to 19.8% who chose the second statement (i.e. economic growth should be given priority).

Table 3. Frequency distributions of perceived seriousness and conservation/development priority (n=81)

	Percentage (%)
How serious is the problem of decline and possible extinction of the Chinese white dolphins in Hong Kong?	
not at all serious	-
not very serious	4.9
moderately serious	49.4
very serious	38.3
I don't know	7.4
With which one of these statements about economic growth and the Chinese white dolphins do you most agree?	
a) Protecting the Chinese white dolphins should be given priority, even at the risk of slowing down economic growth.	80.2
b) Economic growth should be given priority, even if the Chinese white dolphins suffers to some extent.	19.8

Hypothesis 1: There is no significant relationship between perception of seriousness of threats faced by Chinese white dolphin and conservation/development priority.

Fisher's Exact test was performed to test the relationship between perceived levels of seriousness and conservation/development priority. Fisher's Exact test was used instead of chi-square test because the expected count for 2 of the cells were less than 5. As reported in Table 4, the test found that there is a significant relationship and strong association between the two variables, $\varphi = .348$, $p = .025$. According to adjusted standardized residuals, among respondents who perceived the threats faced by Chinese white dolphin as not very serious, there were more who prioritize development over conservation than expected. Figure 2 shows a stacked bar chart that represents the percentage contribution each level of perceived seriousness contribute to conservation priority and development priority.

Table 4. Fisher's Exact test of perceived seriousness and conservation/development priority

		Development N=14			Conservation N=61			P
		n	%	SR	n	%	SR	
Perceived Seriousness	not very serious	3	21.4	**2.6**	1	1.6	-1.2	.025*
	moderately serious	7	50.0	-0.2	33	54.1	0.1	
	very serious	4	28.6	-0.7	27	44.3	0.4	

*Statistically significant at the 0.05 level

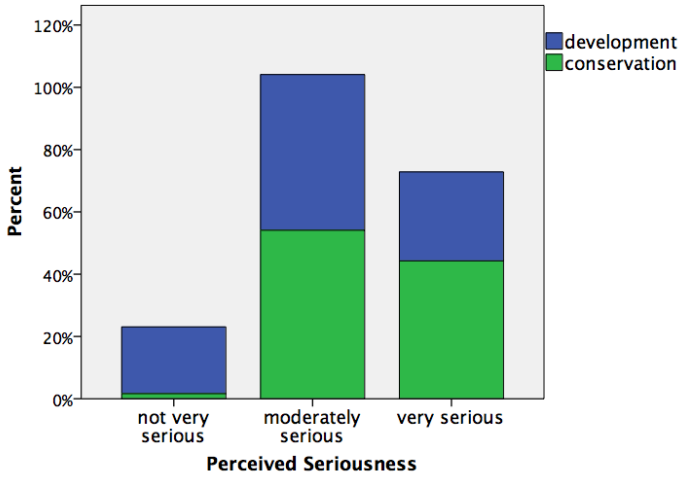

Figure 2. Stacked bar chart for perceived seriousness and conservation/development priority

Hypothesis 2: Levels of perceived seriousness of threats faced by Chinese white dolphin do not differ significantly between socio-demographic factors/dolphin-watching experience/environmental value orientations.

Mann-Whitney U test and Kruskal-Wallis test were performed to examine differences in perceived seriousness between groups. Table 5 presents the statistical result generated by both tests. Only dolphin-watching experience was found to be significantly different in relations to perceived seriousness. The perceived seriousness levels for those who

have dolphin-watching experiences (mean rank = 47.12) were statistically significantly higher than for those who have no dolphin-watching experience at all (mean rank = 34.45), U = 759, z = -2.562, p = .01. Figure 3 shows a stacked bar chart that represents the percentage contribution dolphin-watching experience (Yes/Never) contribute to each level of perceived seriousness.

Table 5. Univariate analyses comparing variables with perceived seriousness level

Variables	Z or X^2	P
Gender	-0.091	.928[1]
Age	3.112	.375[2]
Education	-1.771	.077[1]
Income	0.481	.786[2]
Dolphin-watching experience	-2.562	.01*[1]
Value orientation	1.264	.206[1]

*Statistically significant at the 0.01 level.

[1]Mann-Whitney *U* test was applied.

[2]Kruskal-Wallis test was applied.

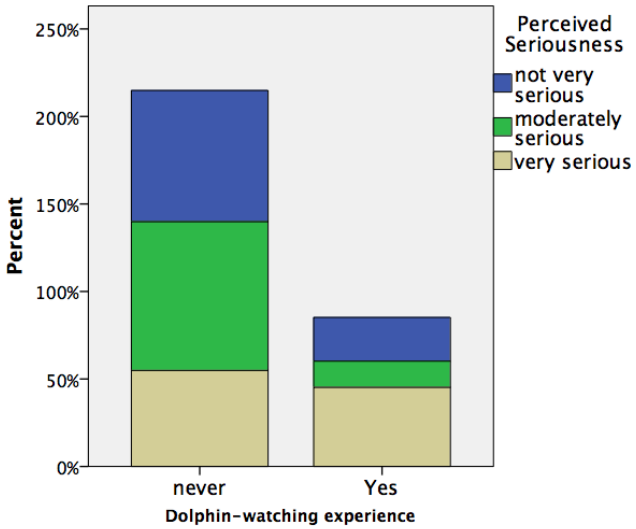

Figure 3. Stacked bar chart for dolphin-watching experience and perceived seriousness

Hypothesis 3: Conservation/development priorities do not differ significantly between socio-demographic factors/dolphin-watching experience/environmental value orientations.

Chi-square test and Fisher's Exact test were performed to examine differences in conservation/development priority between groups. Of the 5 relationships tested, three were significant: gender, age and income level. Results of the Chi-square test and Fisher's Exact test can be found in Table 6, and results of the post-hoc tests can be found in Table 7. The finding shows that male and female are significantly different in conservation/development priority and there is a strong association between the two variables, $\chi 2(1, N=81) = 9.44$, $\varphi = .341$, $p = .004$. Male are found to be more likely than female to prioritize development over conservation. Of the 16 respondents who chose development, 81.3% were male, whereas of 65 respondents who chose conservation, 61.5% were female. Different age groups are found to be significantly different and there is a strong association between the two variables, $\varphi = .394$, $p = .015$. According to standardized adjusted residuals, among respondents who were more than 50 years old, there were more who prioritize development over conservation than would be expected. Of the 16 respondents who chose development, 50% belonged to the age group >50. The finding also shows that the different income groups are significantly different and again, there is a strong association between the two variables, $\varphi = .317$, $p = .016$. Post-hoc test shows no statistically significant standardized residuals. However it is worth noting that a standardized residual of 1.9, which is extremely close to the critical value of 1.96, shows that those belong to the household income group >$60,000 and prioritize development over conservation contributed the most to the significant result. Of the 16 respondents who chose development, 37.5% belonged to the income group >60,000. Figure 4-6 show three stacked bar charts that represent the percentage contribution different sub-groups within gender, age and income contribute to each level of perceived seriousness respectively.

Table 6. Univariate analyses comparing variables with conservation/development priority

		Development N=16		Conservation N=65		X^2	P
		n	%	n	%		
gender	male	13	81.3	25	38.5	9.439	.002**[1]
	female	3	18.8	40	61.5		
age group	15-24	2	12.5	24	36.9		
	25-34	1	6.3	16	24.6		.015*[2]
	35-49	5	31.3	13	20.0		
	>50	8	50.0	12	18.5		
attended uni?	no uni	5	31.3	22	33.8	.039	.844[1]
	uni	11	68.8	43	66.2		
income level	<20,000	6	37.5	18	27.7		
	20,000-60,000	4	25.0	39	60.0		.016*[2]
	>60,000	6	37.5	8	12.3		
dolphin-watching	never	13	81.3	44	67.7		.37[2]
activities?	Yes	3	18.8	21	32.3		
		N=8		N=57			
value orientation	altruistic	3	37.5	33	57.9		
	biospheric	5	62.5	24	42.1		.45[2]

**Statically significant at the 0.01 level, *at the 0.05 level

[1]Chi-square test was applied.

[2]Fisher's exact test was applied.

Table 7. Post-hoc analysis on gender, age group and income groups vs conservation/development priority

		Standardized Residuals	
		Development	Conservation
gender	male	**2.0**	-1.0
	female	-1.9	0.9
age group	15-24	-1.4	0.7
	25-34	-1.3	0.6
	35-49	0.8	-0.4
	>50	**2.0**	-1.0
income group	<20,000	0.6	-0.3
	20,000-60,000	-1.5	0.8
	>60,000	1.9	-1.0

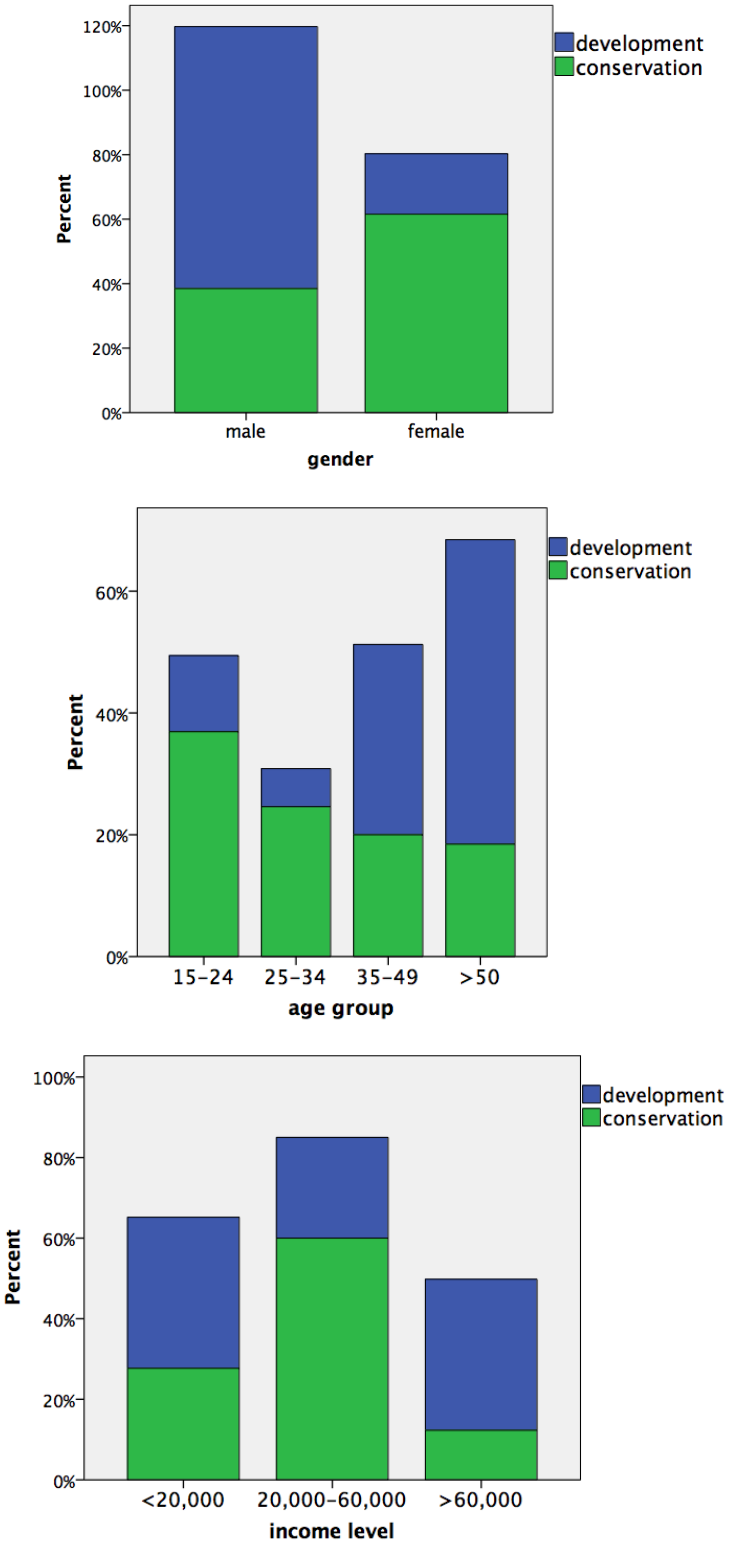

Figure 4-6. Stacked bar charts for gender, age and income, and conservation/development priority

Hypothesis 2 & 3: Levels of perceived seriousness of threats faced by Chinese white dolphin and conservation/development priorities do not differ significantly between knowledge levels.

The performance of 81 respondents on the knowledge test is presented in Table 8 and can be summarized as follows: Over 90% of the respondents were able to answer Q.1 correctly and around 50% answered Q.2, 3 or 4 correctly. The most poorly performed questions were Q.5 and 6, which were only answered correctly by 14.8% and 29.6% of the respondents. A majority of respondents (92.6%) answered at most 4 questions correctly in the knowledge test for Chinese white dolphin, among which 9 of them (11.1%) answered only 1 question correctly and 51 of them (63%) were able to answer 2 or 3 questions correctly. Only 7.4% of total respondents answered more than 4 questions correctly and 4 respondents (4.9%) were able to give all correct answers. Spearman's rho and Point biserial correlation coefficient were calculated to determine the relationship between the number of correct answer and perceived seriousness, and the relationship between the number of correct answer and conservation/development priority respectively. Table 9 presents both the findings. Based on the results, there was no significant relationship found.

Table 8. Frequency distribution of correct answers for each question and each respondent

		N=81	
		n	%
Q1. Which animal group does the Chinese white dolphin belong to?		75	92.6
Q2. “Chinese white dolphins can only be found in Hong Kong waters.” True or false?		40	49.4
Q3. Where can the Chinese white dolphins be found in Hong Kong?		44	54.3
Q4. How many Chinese white dolphins were there in Hong Kong in 2013?		41	50.6
Q5. What are the threats faced by the Chinese white dolphins today in Hong Kong?		12	14.8
Q6. Which marine park/reserve is designated for the protection of Chinese white dolphins?		24	29.6
number of questions answered correctly by each respondent	0	0	0
	1	9	11.1
	2	26	32.1
	3	25	30.9
	4	15	18.5
	5	2	2.5
	6	4	4.9

Table 9. Association between knowledge level and perceived seriousness, and conservation/development priority

Spearman's rho	Perceived Seriousness	Correlation Coefficient	-.116
		Sig. (2-tailed)	.323
		N	75
Point-biserial	Conservation/ Development	Pearson Correlation	-.015
		Sig. (2-tailed)	.898
		N	81

5. DISCUSSION

5.1. Interpretation

The main goal of the study was to determine the overall level of concern Hong Kong people have for the conservation of Chinese white dolphin and to identify the array of factors that lead to differences in their level of environmental concern.

5.1.1. Overall concern for Chinese white dolphin

The findings suggest that there is widespread concern about the seriousness of threats faced by Chinese white dolphin and that the public favour conservation of Chinese white dolphin over economic development. The perceived seriousness of the problem also turns out to be closely linked to the conservation/development tradeoff. Those who perceived the threats faced by Chinese white dolphin less severely are more likely to agree to the statement that economic growth should be given priority, even if the Chinese white dolphins suffers to some extent. This finding supports previous studies that suggest those who see environmental problems as urgent tend to place more importance on the environment (Axelrod & Lehman, 1993). In establishing such link, the study confirms and expands the findings of previous research on perceived seriousness and environment/economic tradeoff as effective measurements of environmental concern.

5.1.2. Sociodemographic determinants of environmental concern

Following on advices from previous studies to improve study on the relationship between sociodemographic variables and environmental concern, this study has focused on a particular environmental issue and has addressed the tradeoff, i.e. economic development, associated with it (Wall, 1995; Van Liere and Dunlap, 1980). However, similar to the majority of studies, the finding suggests that demographic factors are still generally limited in explaining differences in environmental concern except that they

seem to contribute the most to the tradeoff aspect of environmental concern but not to the perception of seriousness of problem. The results show that conservation/development priority significantly differs among the sexes, age groups and household income groups. Female are more likely than male to prioritize conservation over development, whereas older people and those with a higher household income tend to express priority for development instead of conservation.

According to the 2013 Census (GovHK, 2014), the gender finding seems to fit the “gendered social role” argument. Labour force participation continues to be dominated by men although the gap between women and men has greatly diminished over the past three decades. Women also tend to exit the labour force after marriage. This reflects that women in Hong Kong still largely assume the traditional role of homemaker. It has been proposed that the greater participation of men than women in the paid labour force has led to men internalizing a “marketplace mentality”, which “favors economic growth and exploitation of natural resources for human benefit”, and to women internalizing a “motherhood mentality”, which “favors protection of nature and other species” (McCright, 2010). Based on this argument, it is therefore reasonable to expect more women in Hong Kong to express priority for conservation than men.

The findings also correspond with previous studies that suggest older generations are less concerned about environmental problems compared to younger people (Arcury and Christianson, 1990; Van Liere and Dunlap, 1980; Howell and Laska, 1992; Dunlap and Jones, 1992; Kanagy et al., 1994; Martinsons et al. 1997; Dietz et al., 1998; Riechard and Peterson, 1998; Connell et al. 1999). A research done in Hong Kong (Wong and Wan, 2011) has found that the younger generations were significantly more anxious about environmental damage and that older people were more likely to believe that science can solve environmental problems. This relative optimism shown by the older generations towards the environment may explain why they are more likely to prioritize economic development over conservation. The relative importance given to conservation by younger people has a significant implication for future environmental movement. The “Umbrella Movement”, a student-led protest demanding for universal

suffrage for the 2017 Hong Kong chief executive elections, has spawned a new political generation comprising mainly of local students. The increasing political power held by the younger generation means that conservationists would benefit from working closely with influential student organizations such as the Hong Kong Federation of Students and Scholarism.

Contrary to the majority of past studies, higher household income is found to predict less environmental concern. With the lack of established theoretical explanation, we could at best propose tentatively that this negative relationship between household income and environmental concern was partially due to the underrepsentation of the less than $20,000 income group in the sample as well as the nature of economic tradeoff associated with the conservation of Chinese white dolphin. Whereas economic costs of environmental problems such as air and water pollution are usually borne by the government (e.g. increased regulation and enforcement) and then passed down to the general public via taxation, the loss of income gain from ruled out large-scale coastal infrastructural development projects affect those with a higher household income more directly, since a larger portion of their income comes from investment, compared to those with a lower household income, whose income comes primarily from employment (Census and Statistics Department, 2012).

In addition, while results from most of the previous studies consistently report a positive relationship between education level and environmental concern (Van Liere and Dunlap, 1980; Arcury and Christianson, 1990; Howell and Laska, 1992; Jones and Dunlap, 1992; Kanagy et al. 1994; Elliott et al. 1997; Dietz et al. 1998; Liu et al. 2014), there has not been any significant relationship found in this empirical study. This may be suggestive of the equally important role of pre-secondary institutions and post-secondary institutions, or the equally lack thereof, in encouraging and fostering pro-environmental concern.

While the finding that the younger generations express a higher environmental concern represents a promising future for conservation outlook since they “could act as a

potential force for “contentious collective action” in the environmental movement (Tarrow, 1998, p. 10)” (Lee, 2011), the gender gap, age gap and income gap found in the study suggest that conservation practitioners should direct more efforts toward particular social groups who are less environmentally concerned, i.e. male, older and wealthier citizens.

5.1.3. Level of subject familiarity and environmental concern

With regard to public knowledge of the Chinese white dolphin, it is found that while the public demonstrates some general species knowledge, they are typically unaware of scientific or conservation details. Processes that lead to the decline of the Chinese white dolphin are also commonly wrongly attributed, suggesting that there is a lack of understanding about anthropogenic impacts on the animal. The lack of significant relationships found between knowledge and the two measurements of environmental concern in the study resonates with previous studies that suggest possession of knowledge is not a necessary function of environmental concern (Arcury 1990; Schahn and Holzer, 1990; Dunlap 1998; Hayes, 2001; Hunter & Rinner, 2004; Levine and Strube, 2012).

The only significant difference in perceived seriousness of threats faced by Chinese white dolphin is found between those who have and have not participated in dolphin-watching activities. Those who had first-hand encounter with Chinese white dolphins are more aware of the severity of the problems faced by the animal. Since we already found that the possession of species-related knowledge does not contribute significantly to the difference in environmental concern, the significant relationship between dolphin-watching activities and perceived seriousness thus cannot be explained by the educational focus of the activities as suggested by previous empirical studies (Birtles et al. 2002; Wilson and Tisdell, 2003; Mayes et al. 2004), but the effect of personal encounter with the animal in their natural habitat. According to Ballantyne et al. (2011), by being in the same environment as the animal and witnessing directly the conditions these animals are living in, visitors not only gained first-hand understanding of the

problem, they established a sense of relationship with the species as a whole which made environmental issues more personal and relevant.

The lack of significant result found for knowledge certainly does not provide the motive for conservation practitioners to abandon their focus on education as a mean to promote environmental awareness. In fact, environmental education has been given central place in efforts to achieve sustainable development and empirical studies have shown that high level of public awareness of environmental issues has been a direct result of sustained educational efforts by both the state and private organizations (Blum, 2008). What could be suggested from the findings, then, is that simple provision of environmental information or knowledge may not be the most effective approach in bringing about substantial changes to attitudes and behaviors. Our study provides the evidence that transformative outcome can by produced instead by harnessing the power of first-hand wildlife encounter in evoking feelings of protectiveness and concern that may eventually lead to positive behavioral responses towards the environment. It is therefore recommended that conservation practitioners should focus on providing more opportunities for the public to get close with the dolphins in their natural setting.

5.1.4. Value orientations and environmental concern

Same as education level and knowledge, the results show that there is no significant difference in environmental concern between value orientations. Nevertheless meaningful conclusion can still be obtained by simply looking at the distribution of sample data, assuming that the values/environmental concern argument holds true. Accordingly, respondents generally possess strong altruistic or biospheric orientation, with altruistic values (55%) slightly stronger than biospheric values (45%). It reflects that the public are more concerned with the welfare of the society and environment than their own interest. The overall finding demonstrates the public's recognition that conserving Chinese white dolphins would bring greater benefits to the society or the environment than economic development would do. Although the analysis has been incomplete due to the lack of sample that demonstrates egoistic orientation, the result shows that

respondents with altruistic orientation does not express less concern for Chinese white dolphin than those with biospheric orientation. In fact, contrary to previous studies which suggest biospheric orientation is more indicative of pro-environmental concern than altruistic orientation (De Groot & Steg, 2008), with a higher proportion of respondents within the altruistic group choosing conservation over development compared to the biospheric group, the result maybe suggesting the opposite, although the difference is found to be insignificant. It could be concluded that the public evaluate the importance of the conservation of Chinese white dolphin based on its benefits to both the society as a whole and the environment more than to themselves as individuals. It is perhaps useful then for conservation practitioners to frame the issue of species decline or extinction as one of social problem in addition to environmental problem, highlighting the long-lasting and irreversible impacts it would have on the overall wellbeing of humanity, such as the loss of ecosystem service and psychospiritual benefits the species provides. Similarly, conservation practitioners could also work with organizations that place emphasis on altruistic values such as those in the non-profit sector and religious groups.

5.2. Limitation

5.2.1. Response bias

In addition to sampling bias from the sampling method used, response biases were likely to have been encountered because of contextual and environmental factors. Response bias refers to conditions or factors that take place during the process of responding to surveys, resulting in deviation of the respondents' reported answers from their true answers (Villar, 2008). Because response bias could affect the quality of the data, thus compromise the validity of the findings, it is important to take into account all possible biases when interpreting results and drawing conclusions. Several possible response biases have been identified in this study and are summarized as follows.

1. Since the survey was carried out when the debate over the third runway construction project came to the forefront of the public's attention during the project's public

inspection phase for the Environmental Impact Assessment (EIA), responses to the questionnaires could have been affected by the effect of urgency of the issue at the time. When asked to make tradeoff decision between the two options, respondents are more likely to choose the issue that is more urgent or that they are less confident about. Similarly, more respondents chose conservation of Chinese white dolphin than development could have been due to the rising sense of urgency people experienced concerning the impact of the third runway project on the Chinese white dolphins during the time of the survey.

2. Social desirability bias was likely to have been induced by the effect of the setting in which the questionnaires were carried out. “Social desirability is the tendency of some respondents to report an answer in a way they deem to be more socially acceptable than would be their "true" answer. They do this to project a favorable image of themselves and to avoid receiving negative evaluations. The outcome of the strategy is overreporting of socially desirable behaviors or attitudes and underreporting of socially undesirable behaviors or attitudes.” (Callegaro, 2008) Since sample data were collected from the book fair, during which the Hong Kong Dolphin Conservation Society (HKDCS) was campaigning against the third runway project at their stall, respondents could have been influenced by the presence of an environmental group, thus failing to reflect their initial responses.
3. The way the survey was introduced could have had an effect on how respondents answer the questionnaires. As respondents were made aware the subject matter of the research, i.e. conservation of the Chinese white dolphins, at the outset, they might feel pressured into giving pro-environmental responses so that they wouldn’t appear materialistic or anti-environmental.

5.2.2. Schwartz value survey

The SVS was used to determine which value orientations (i.e. egoistic, altruistic and biospheric) each respondent subscribes to. However a complete lack of egoistic data from the sample has resulted in failure to thoroughly examine the relationship between values and environmental concern. Again, response bias may have had a role in causing

this defect in sample data. It has been found that socially desirable responding (SD) “would lead people to match own value ratings to those of important in their social environment” (Schwartz et al. 1997), albeit the weak relationship. Another possible reason is that Hong Kong, despite heavily influenced by Western values from the colonial era, remains a fundamentally collectivist society where people act in the interests of the ‘groups’ they belong to instead of themselves (Lonner et al. 1980). The emphasis on collective interest could be the reason why the sample was biased towards altruistic and biospheric values. Empirical studies are therefore needed to continue examining the influence SD has on the SVS as well as the applicability of the three-factor model in non-Western cultures.

5.2.3. Univariate analysis

All hypotheses were tested with a series of univariate analysis, which assumes that the response variable is influenced only by one factor. This method therefore did not account for the effects of possible interdependence among the predictor variables. To the extent that the predictor variables do interact with each other in affecting the response variable, multivariate analysis could be a more appropriate method. A regression analysis would be conducive also in that it would tell us which variable(s) predicts greater environmental concern in addition to the differences between groups. Unfortunately, given the small sample size and unbalanced data, the study had not been able to allow for such statistical analyses. Provided that a large enough set of data is collected, a statistical strategy that combines univariate analysis for an initial evaluation of data and multivariate analysis for a more in-depth examination of the relationship between the response variable and a set of factors may therefore be ideal for producing more solid and conclusive findings.

5.3. Implications for future research

The overall study has several important implications for future research on general environmental concern as well as concern for Chinese white dolphin specifically. In this

study we only focused on the importance of the conservation of Chinese white dolphin relative to economic development in general. It would however be interesting to also look at its importance in comparison to specific economic and social issues such as employment, housing and social welfare. Although these issues do not have direct tradeoff relationships with the conservation of the species, these issues are more relevant to people's daily life and could therefore be more accurate in reflecting the relative importance of the animal to people. In addition, the study has explored the differing effects socio-economic attributes, level of subject familiarity and value orientations have on environmental concern. Nevertheless predictors of environmental concern are not limited to these variables. Other determinants could include membership of environmental groups, political affiliation, religion, etc. A more comprehensive study would be useful in producing a clearer picture of the different processes that shape public perception of the issue. More attention should also be paid to examine the perceived economic and cultural values of the Chinese white dolphin. Income brought by ecotourism (e.g. dolphin-watching tours) and the representativeness of the dolphins as an indigenous species as well as its symbolic value to Hong Kong could have had an effect on how people value the animal and assign priority to its conservation. Moreover, while heightened environmental concern does not necessarily denote increased pro-environmental behaviors, future research should examine how concern for Chinese white dolphin is or is not further translated into actual action (e.g. environmental activism). Lastly, the lack of significant relationship found between knowledge and environmental concern in this study and other empirical studies suggests an alarming deviation of reality from the common rhetoric that a "well-informed public can act as the most important means of promoting effective conservation of native species." (Puppim De Oliveira et al. 2010). Further research on this link are thus needed to ensure that conservation efforts are directed to the right direction.

6. CONCLUSION

For decades, Hong Kong has been faced with a dilemma created by concerns about the future availability of lands and the impact of coastal development on the population of the Chinese white dolphins. As the government continues to lay out extensive development plans that are clearly detrimental to the animal and the environment in general, people have started to question the sustainability of the reclamation-led urban developmental strategy and opposition from various interest and environmental groups has served as a key obstacle to the implementation of such development. This stand-off between the pro-developmentalists and pro-environmentalists has necessitated an investigation into the public perception of environmental issues in relation to development policies.

In this study we have asked the following questions: How is public participation relevant to sustainable development? Why is environmental concern important in environmental planning and management? In answering these questions, we investigated via survey: How concerned are Hong Kong people about the conservation of Chinese white dolphin? Who do (not) support conservation? Based on the overall findings, it could be summarized that the public are generally concerned about the Chinese white dolphin and would even forgo economic development in favor of its conservation. While people who have participated in dolphin-watching activities are more aware of the severity of threats faced by the Chinese white dolphin, men, older and wealthier people are more inclined to prioritize economic development over conservation of the species. We have also attempted to gain an understanding of the underlying causes for the varying levels of concern expressed by different social groups. The results reported herein contribute to, and expand on, the literature on public environmental concern with regard to local species. By examining the perception of Hong Kong citizens regarding the conservation of Chinese white dolphin, I hope my study would also be able to assist in developing strategies for urban environmental management with a focus on public participation. The next step therefore will be to ask how we should continue fostering environmental

concern, and more importantly, how we can initiate substantial attitude changes in those who are less environmentally concerned.

The Brundtland Commission Report acknowledges the role of non-governmental organizations (NGOs) “in the creation of public awareness and political pressures that stimulate governments to act.” (Brundtland, 1987) The NGOs are instrumental in developing a strategic plan that should not only create awareness but also opportunities where citizens could assume responsibilities and become directly involved in the protection of their surrounding ecosystems. The role of environmental education and community participation in creating awareness is pivotal for the long-term realization of such a plan. NGOs should not simply provide the information specific to local species, they should also focus on forging an increased awareness of the ecosystem services by demonstrating the significance of ecological integrity and biological diversity more broadly. An understanding of the benefits of ecosystem services to human well-being does not only have the potential to engender support for protecting native species, it can contribute to the development of a more resource-efficient city, where the urban ecosystems would be fully appreciated and preserved accordingly. Furthermore, in order to garner broad-based public support for biodiversity conservation, attention should be paid to renewing a sense of nature connectedness by designing and planning the built environments in a way so as to allow for meaningful interactions between citizens and nature. Realizing these goals will require collaborations between conservation scientists and professionals and experts from different disciplines, such as city planners, landscape designers, health practitioners, education practitioners and social workers, as well as the general public. It is only through dialogues, partnerships and concrete actions that we can bring about positive changes at both grass-roots and policy level.

Lastly, as long as economic growth remains a primary policy goal, and to the extent such policy is effective, habitat destruction and subsequently, biodiversity loss will continue. How can Hong Kong satisfy the ever-growing demand for lands without doing irreparable damage to the ecosystem? Can we reclaim enough lands necessary for

economic development and, at the same time, avoid the extinction of the Chinese white dolphins? And most importantly, what lies in the future for Chinese white dolphins in Hong Kong? These questions remain to be answered and as our study might be suggestive of an environmental awakening within our younger generations, who would eventually take up more societal and political responsibilities in the near future, perhaps what we should do in the mean time is to continue instilling pro-environmental values in them through education and experimenting with different communication and awareness strategies that would amass adequate public support for the conservation of Hong Kong's most beloved animal.

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8. APPENDICES

Appendix A: Questionnaire (English version)

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University of Sussex

Participant Information Sheet

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

Project Title: "Public Perception and Determinants of Concern on the Conservation of Chinese White Dolphins in Hong Kong"

The study aims to investigate public perceptions of the conservation of Chinese white dolphin. Based on the findings, we hope to suggest recommendations for conservation groups on improving environmental education and public awareness campaigns.

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. All information collected will be kept strictly confidential in accordance with the Data Protection Act 1998. Privacy and anonymity will be ensured in the collection, storage and publication of research material.

If you have any concerns about the way in which the study has been conducted, please contact: David Ockwell, University of Sussex, d.g.ockwell@sussex.ac.uk.

THANK YOU FOR TAKING TIME TO READ THE INFORMATION SHEET AND YOUR HELP WILL BE MUCH APPRECIATED.

Consent Form

Project Title: "Public Perception and Determinants of Concern on the Conservation of Chinese White Dolphins in Hong Kong"

I agree to take part in the above University of Sussex research project and I have read and understood the Information Sheet.

I understand that any information I provide is confidential, and that no information that I disclose will lead to the identification of any individual in the reports on the project, either by the researcher or by any other party.

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

Name: _____

Signature _____

Date: _____

Section 1

1. How serious is the problem of decline and possible extinction of the Chinese white dolphins in Hong Kong?

   ☐ not at all serious

   ☐ not very serious

   ☐ moderately serious

   ☐ very serious

   ☐ I don't know

2. With which one of these statements about economic growth and the Chinese white dolphins do you most agree?

   c) Protecting the Chinese white dolphins should be given priority, even at the risk of slowing down economic growth.

   d) Economic growth should be given priority, even if the Chinese white dolphins suffers to some extent.

   ☐ a ☐ b

Section 2: Knowledge test

Q1. Which animal group does the Chinese white dolphin belong to?

☐ Fish ☐ Bird ☐ Reptile

☐ Mammal ☐ Amphibian

Q2. "Chinese white dolphins can only be found in Hong Kong waters." True or false?

☐ True ☐ False

Q3. Where can the Chinese white dolphins be found in Hong Kong?

☐ South, west and north of Lantau Island

☐ South and east of Lantau Island

☐ South of Hong Kong Island

☐ Sai Kung (eastern waters of Hong Kong)

☐ None of the above

Q4. How many Chinese white dolphins were there in Hong Kong in 2013?

☐ 38 ☐ 61 ☐ 94 ☐ 120

Q5. Which of the following are threats faced by the Chinese white dolphins today in Hong Kong? (check all that apply)

☐ Habitat loss ☐ Water pollution ☐ Underwater noise pollution

☐ Hunting ☐ Marine traffic ☐ Over-fishing

Q6. Which of the following is designated for the protection of Chinese white dolphins?

☐ Hoi Ha Wan Marine Park ☐ Yan Chau Tong Marine Park

☐ Sha Chau and Lung Kwu Chau Marine Park

☐ Tung Ping Chau Marine Park ☐ Cape D'Aguilar Marine Reserve

Section 3: Values

In this part you are to rate how important each value is for you as a guiding principle in your life, using the rating scale below:

AS A GUIDING PRINCIPLE IN MY LIFE, this value is:

extremely unimportant	not important			important			very important	of supreme importance
0	1	2	3	4	5	6	7	8

Steps

1) Identify **only one** value that is *extremely unimportant* to you and circle 0.
2) Identify **only one** value that is of *supreme importance* to you and circle 8.
3) Choose from 1 to 7 for the rest of the values.

*Try to distinguish as much as possible between the remaining values by using all the numbers. You will, of course, need to use some numbers more than once.

1. Equality (equal opportunity for all)	0	1	2	3	4	5	6	7	8
2. Respecting the earth (harmony with other species)	0	1	2	3	4	5	6	7	8
3. Social power (control over others, dominance)	0	1	2	3	4	5	6	7	8
4. Wealth (material possessions, money)	0	1	2	3	4	5	6	7	8
5. A world at peace (free of war and conflict)	0	1	2	3	4	5	6	7	8
6. Unity with nature (fitting into nature)	0	1	2	3	4	5	6	7	8
7. Authority (the right to lead or command)	0	1	2	3	4	5	6	7	8
8. Social justice (correcting injustice, care for the weak)	0	1	2	3	4	5	6	7	8
9. Ambitious (hard-working, aspiring)	0	1	2	3	4	5	6	7	8
10. Protecting the environment (preserving nature)	0	1	2	3	4	5	6	7	8
11. Influential (having an impact on people and events)	0	1	2	3	4	5	6	7	8
12. Helpful (working for the welfare of others)	0	1	2	3	4	5	6	7	8
13. Preventing pollution (protecting natural resources)	0	1	2	3	4	5	6	7	8

Section 4: Basic information

1. Gender: ☐ Male ☐ Female

2. Age:

☐ 15-24 years ☐ 25-34 years ☐ 35-49 years

☐ 50-64 years ☐ over 65 years

3. Level of education:

☐ Primary or below ☐ Secondary ☐ Post-secondary

4. Monthly household income (HK$):

☐ Under 20,000 ☐ 20,001–60,000 ☐ 60,001-100,000

☐ More than 100,000

5. Have you participated in any of the following dolphin-watching activities in Hong Kong? (check all that apply)

☐ Tour organized by the Hong Kong DolphinWatch Ltd.
The last time you went (month/year): _____/_____

☐ Tour organized by local operators in Tai O.
The last time you went (month/year): _____/_____

☐ Others. Please specify: _____
The last time you went (month/year): _____/_____

☐ Never

Appendix B: Questionnaire (Chinese version)

University of Sussex

參與者資料頁

您好！本人是英國薩塞克斯大學的學生，現正就畢業論文收集資料。煩請閣下抽數分鐘時間閱讀以下資料。

研究題目：「香港公眾對中華白海豚保育議題的理解與立場」

此研究的目的是要了解香港公眾對中華白海豚保育議題的理解與立場，從而為保育團體提供建議，改進提升公眾環境教育和意識的活動。
閣下的參與是完全自願的。如選擇參與，閣下將會需要填寫同意書和問卷，需時不會超過五分鐘。
閣下並可以隨時改變主意，停止參與此研究。**根據《個人資料（私隱）條例》，本人會對所持有的任何個人資料保密，並會匿名處理**。

如有任何疑惑或問題，請聯絡:
David Ockwell, University of Sussex, d.g.ockwell@sussex.ac.uk

非常感謝閣下抽空閱讀此資料頁和填寫問卷！

參與者同意書

研究題目：「香港公眾對中華白海豚保育議題的理解與立場」

本人同意參與此研究並已閱讀參與者資料頁。
本人允許個人資料用於此研究並明白所提供的任何個人資料將會被保密和匿名處理。
本人明白參與此項研究全屬自願性質。本人並可以隨時改變主意，停止參與此研究。

名字：_____

簽署：_____

日期：_____

第一部分

1. 你認為香港中華白海豚數目下降和可能於不久的將來絕跡香港水域的問題有多嚴重？

☐ 完全不嚴重

☐ 可以接受

☐ 嚴重

☐ 極度嚴重

☐ 不清楚

2. 你最同意以下哪一個關於經濟發展與中華白海豚的陳述？

甲）保護中華白海豚應得到優先考慮，即使經濟發展可能會因此受到延阻。

乙）經濟發展應得到優先考慮，即使中華白海豚可能會因此受到影響。

☐ 甲　　☐ 乙

第二部分: 知識測驗

Q1. 中華白海豚屬於以下哪一項動物種類？
☐ 魚類　☐ 鳥類　☐ 爬行類　☐ 哺乳類　☐ 兩棲類

Q2. 「中華白海豚是香港獨有的。」
以上陳述正確嗎？
☐ 正確　☐ 不正確

Q3. 中華白海豚在以下哪個主要地點出沒？
☐ 大嶼山南面，西面及北面　☐ 大嶼山東面及北面
☐ 香港島南面　☐ 西貢（香港東面水域）
☐ 以上皆不是

Q4. 2013 年期間香港有多少條中華白海豚？
☐ 38　☐ 62　☐ 94　☐ 120

Q5. 以下哪幾項是香港中華白海豚現時所面對的生存威脅？（可選多項）
☐ 棲息地消失　☐ 水質污染　☐ 水底噪音污染

☐ 獵殺　　☐ 海上交通　　☐ 過度捕魚

Q6. 以下哪一項是專為保護中華白海豚而設的海岸公園或海岸保護區？

☐ 海下灣海岸公園　　☐ 印洲塘海岸公園
☐ 沙洲及龍鼓洲海岸公園　　☐ 東平洲海岸公園
☐ 鶴咀海岸保護區

第三部分: 價值觀

請你根據自己的生活原則，為每一項價值觀給予評級。

指示

第一步：從下列選出一項最不重要的價值觀並圈出 0 。
第二步：從下列選出一項最重要的價值觀並圈出 8。
第三步：為餘下的價值觀圈出其他評級（1-7），請務必使用 1-7 所有評級，部分數字會被使用多於一次。

根據我的生活原則,此價值觀是	極不重要	不重要	《 重要 》					非常重要	極度重要
1.公平 (所有人得到平等機會)	0	1	2	3	4	5	6	7	8
2.尊重地球 (與其他生物和諧共處)	0	1	2	3	4	5	6	7	8
3.社會權力(支配，控制別人)	0	1	2	3	4	5	6	7	8
4.財富 (物質擁有，金錢)	0	1	2	3	4	5	6	7	8
5.世界和平 (沒有戰爭和衝突)	0	1	2	3	4	5	6	7	8
6.與自然和諧一體 (配合大自然)	0	1	2	3	4	5	6	7	8
7.權威 (領導和發號指令的權利)	0	1	2	3	4	5	6	7	8
8.社會公正 (糾正不公平的事，照顧弱勢社群)	0	1	2	3	4	5	6	7	8
9.有抱負的 (勤奮，熱切)	0	1	2	3	4	5	6	7	8
10.保護環境 (維持大自然現狀)	0	1	2	3	4	5	6	7	8
11.有影響力的 (對人和事有影響力)	0	1	2	3	4	5	6	7	8

12.幫助 (維護和提高人們的福利)	0	1	2	3	4	5	6	7	8
13.防止污染 (保護自然資源－e.g.水和空氣)	0	1	2	3	4	5	6	7	8

第四部分: 基本資料

1. 性別: ☐ 男 ☐ 女

2. 年齡:

☐15-24 ☐ 25-34 ☐ 35-49 ☐ 50-64 ☐ 65 以上

3. 教育程度:

☐ 小學或以下 ☐ 中學 ☐ 專上教育或以上

4. 每月住戶收入 (HK$):

☐ 20,000 以下 ☐ 20,001–60,000 ☐ 60,001–100,000

☐ 100,000 以上

5. 你有否曾經在香港參與以下任何觀豚活動？ (可選多項)

☐ 由香港海豚觀察有限公司 (Hong Kong DolphinWatch Ltd.) 舉辦的觀光團
最後參與時間 (月/年): _____/_____

☐ 乘坐大澳開出的小型快船觀豚
最後參與時間 (月/年): _____/_____

☐ 其他，請註明: _____
最後參與時間 (月/年): _____/_____

☐ 從未參與