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Is wild meat luxury? Quantifying wild meat demand and availability in Hue, Vietnam

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ABSTRACT

Increasing urban wild meat consumption in Vietnam poses a major threat to faunal biodiversity. However, little is known about the numbers, demand, social status, and frequency of wildlife meat consumers in Thua Thien Hue province, where wild meat consumption appears to be common. We combined the results of 329 semi-structured interviews of male Hue citizens in Thua Thien Hue province, Vietnam, with interviews in 20 restaurants to quantify the supply and demand of urban wildlife consumption. We found that 58% of respondents were current wild meat consumers. The most common species reported (in 30% of the cases) was wild pig (*Sus scrofa*). Our results described a typical consumer as a student or being unemployed, usually with higher education, and eating wild meat three times a year. Most (72%) wild meat consumption in Hue city took place in restaurants. Restaurant surveys showed that government staff were the most observed customers in restaurants. Farmed wild meat consumption in Hue was rarely reported (in 23% of the cases); and a typical consumer of farmed wild meat had high education levels. Missing legal mechanisms such as the inability to punish and fining the wild meat consumers was claimed to be an important reason why wild meat consumption has not yet declined. Our combination of survey methods provided different stakeholder views and highlighted the urgent need to monitor the patterns and frequency of wild meat consumption for further law amendments.

1. Introduction

A high diversity of flora and fauna and the ecosystem services these species provide are important as they positively influence human well-being (Díaz et al., 2006; Luck et al., 2009). For instance, the products of wild animal species have been used as food, ornaments, and ingredients of medicine (Chardonnet et al., 2002; Nasi et al., 2008). Meat of wild animal species, from terrestrial mammals to birds and reptiles, is mostly referred to as bush or game meat (Nasi et al., 2008), and meat is globally the most widely used animal product (Chardonnet et al., 2002). In rural areas, particularly in remote and marginalized regions, wild meat is often an important protein and additional income source (Milner-Gulland and Bennett, 2003; CBD, 2011). Urban wild meat trade, in contrast, often occurs in hidden markets and is not traditionally regarded as a necessary protein source but rather as a luxury food (Bennett and Rao, 2002; CBD, 2011).

The use of wild animals in Asia has had a millennia long tradition (Li and Li, 1998). With an increasing purchasing power, the commercial demand for wild meat has gained importance (TRAFFIC, 2008) and the economic benefits are the largest initiator of illegal hunting in South East Asia (Nguyen et al., 2010). Market liberation in China and Vietnam has contributed to an increase in demand for wildlife products and, generally, in commercial trade (Van Song, 2008). Amongst the Asian countries, Vietnam, with a population of 87 million people (GSO, 2013), has scored one of the most rapid economic expansions over the past two decades (ADB, 2012). At present, Vietnam is considered a hotspot of wildlife trade, where wildlife products are being consumed locally as well as exported to foreign urban markets in countries such as China, Korea, and Japan (Van Song, 2008; Nguyen et al., 2010). Vietnam, thus, has been referred to as a "key distribution center" in wildlife trade (Drury, 2009), which has led to a growing number of species being classified by the International Union for conservation of Nature (IUCN) as "endangered" in this country (TRAFFIC, 2008).

Today's consumption of wild meat in Vietnam has been reported to grow amongst the emerging urban middle class as wild meat consumption demonstrates a high social status (Ngoc and Wyatt, 2013). Illegal wildlife trade in Vietnam is rising and is believed to be widespread (Van Song, 2008; Nguyen et al., 2010), which negatively affects wild animal populations and, thus, meat availability (Nguyen et al., 2010). The demand for wild animals was claimed to be greater than the supply and this trend is perceived to be growing (Brooks et al., 2010). Affluent, educated men tend to consume more than the total illegal trade volume reported for Vietnam, which ranges between 3500 and 4000 t per annum; half of this volume is consumed on the domestic market, and in 80% of the cases, the wild products can be found in specialty

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restaurants (Van Song, 2008). Particularly in Thua Thien Hue province (TTH), a tourist attraction due to its plant and animal biodiversity (Nguyen et al., 2010), the consumption of wild has been omni-present and increasing with economic development (Crudge et al., 2010). Hue city was attributed as the key wildlife market in TTH province (Nguyen et al., 2010). However, little is known to date about the wildlife consumption characteristics amongst the general public as well as the location and frequency of consumption in Hue.

Farming wild animals and their products is regarded to be a good conservation tool to reduce the pressure for wild animals from forests by supplying meat and other luxurious or medicinal products (Revol, 1995; Lapointe et al., 2007). It has also been used for re-introducing captive-raised animals into natural forests (Murphy, 2004). Moreover, it is believed that wildlife farms would yield economic benefits and provide an alternative food source instead of obtaining wild meat in an unsustainable way (Cooper, 1995: FAO, 1997; Hardouin et al., 2003; CBD, 2011). However, a number of farms obtain a founder stock from the wild and some wildlife farms are even continuing sourcing of animals from natural forests (WSC, 2008; Brooks et al., 2010). Legal wildlife farming can exist only with a good control of illegal wildlife trade (Lapointe et al., 2007), which has been difficult to achieve in Vietnam (Brooks et al., 2010). However, no research has been conducted on the availability of farmed meat in Hue as well as the acceptance by consumers and their willingness to try.

This study aimed at addressing the current demand and availability of wild meat in Hue, based on restaurant surveys and interviews with the general public of Hue. Further, we investigated the extent of current urban consumption, the consumers' profile, consumption location, events and reasons for consumption. We additionally wanted to identify the wildlife species consumed and the frequency of consumption amongst the residents of Hue city, as well as species offered in restaurants in and adjacent to Hue city. We also investigated the extent of the consumption of farmed wild animals by humans in Hue city, peoples' attitude, level of education and consumption patterns towards farmed wildlife.

2. Methodology

2.1. Study site

Thua Thien Hue province (TTH) in central Vietnam, bordering Lao PDR to the west and the South China Sea to the east, represents a touristic hub, has abundant biodiversity, and stands for a key North–South trade route (Nguyen et al., 2010). The human population in TTH counts more than one million people, and around 300,000 citizens are situated in Hue, the capital of the province (IUCN, 2013). The 5,053 km^2 large province hosts a high fauna biodiversity and rare and endemic species such as crested gibbons (*Nomascuc* spp.), douc langurs (*Pygathrix* spp.), saola (*Pseudoryx nghetinhensis*), southern serow (*Naemorhedus sumatraensis*) and sambar (*Cervus unicolor*) (Van Ngoc et al., 2006; IUCN, 2013). In TTH province, a growing consumption of wild meat has been reported, which poses a major threat to the decreasing wild animal number in the country (Nguyen et al., 2006, 2010). Hue city has been identified as the key urban market for provincial wild meat consumption (Nguyen et al., 2010).

2.2. Data collection and analysis

We applied semi-structured and structured interviews providing quantitative and qualitative data (Bryman, 2008) to address various stakeholder views across wildlife restaurants and amongst the general public (hereafter called street survey) in Hue, TTH province (Fig. 1). In addition, we conducted several informal interviews with field experts in order to better understand the context of the wild meat consumption in Vietnam. We visited restaurants to assess the demand of different wild meat products in a social context; the street survey was aimed at finding characteristic traits of consumers (i.e., social status, income, education, age; see also Table 1) and preferred wild meat species eaten; expert interviews provided the perspectives of several Non-Governmental Organizations (NGOs) and governmental departments on the current and future trends in wild meat consumption as well as its challenges and constraints.

Fig. 1. Location of the study site in Vietnam. The black quadrant indicates Hue city. Source: wikimedia.orgwikipediacommonsee2Vm-map.png.

2.3. Street survey

A structured survey (Bryman, 2008) was conducted in Hue city during May–July 2012 to investigate consumption characteristics, socio-economic properties of consumers, species consumed and farmed wildlife (see also Venkataraman, 2007; Drury, 2009). We

Table 1
Explanatory variables (education, occupation, age, and income) and the proportional distribution of interviewees across the variables. Income is shown in million Vietnamese Dong (VND).

Explanatory variable	Categories	% respondents	Total
Education	None/primary school	17	322
	Junior secondary school	26	
	Secondary school	32	
	Graduate	26	
Occupation	Professional	13	321
	Service worker	21	
	Skilled/unskilled worker	37	
	Student/unemployed	16	
	Retiree	13	
Age	18–24 years	19	324
	25–54 years	56	
	55–64 years	12	
	>65 years	13	
Income	Range	<0.5 to >15	261
	Mean	3.1	
	Median	2.5	

selected respondents based on probability systematic random sampling (Bernard, 1994). Due to time and feasibility constraint and because men are more likely to be wild meat consumers compared to women (e.g. Crudge et al., 2010) we selected only male Hue citizens above 18 years of age. We divided a Google Earth city map of Hue into grids of 500 × 500 m each and randomly chose 30 quadrats, which we visited using a Global Positioning System (GPS) device (Etrex GARMIN). Starting from the east edge of the square along a street, every third house was visited until the entire square was explored. Government offices were excluded from contacting. One male respondent was interviewed per location. The street side to be visited was preselected and marked on a map. Of the total 329 valid cases non-response rate was 55%, which is larger than a typical refusal rate, ranging from 5 up to 30% (Bernard, 1994). The reason for non-response was mostly (in 76% of cases) the unavailability of the respondents while 24% refused to answer the questions. We performed statistical analysis using Statistical Package for the Social Sciences (SPSS) software (IBM, 2011). We tested the frequency of wild meat consumption against the explanatory variables age, education, occupation, and personal income using binary logistic regression (Field, 2009). Personal income was measured as monthly salary in Vietnamese Dong (VND), education and age were categorized into four classes while occupation was categorized into five classes (Table 1). Additionally, we conducted Chi-square tests for comparing locations (classified into restaurants vs non-public places) at which consumption occurred.

2.4. Restaurant interviews

We interviewed 20 restaurant owners and staff in and around Hue city to identify wildlife species supply and demand. We used convenience sampling and informants for restaurant selection. We investigated the wild animal species on offer, asked about the potential of providing farmed wild meat, the source of wild meat, the consumers' profile, and reasons why wild meat was eaten in restaurants in covert interviews. We were accompanied by World Wide Fund for Nature (WWF) staff members as wild meat experts to assist in translation. We applied content analysis of text as a method for quantifying contents of predetermined topics of interest (Bryman, 2008).

3. Results

3.1. Street interviews

3.1.1. Context of wild meat consumption

In Hue city, 279 (85%) of 329 respondents claimed that they have consumed wild meat at least once within their lifetime while 50 respondents (15%) said they have never tried any wild animal food. Of 279 respondents, 189 (68%) respondents reported consumption within the last 12 months of the study, i.e., from hereon called "current consumers". Binary logistic regression showed that personal monthly income significantly explained whether a respondent was a current consumer (Table 2). The odds ratio was rather low, i.e., higher incomes triggered only slightly higher chances to be a current consumer (Table 2). The respondents that had a secondary school education were three times more likely to be wild meat consumers than those with no or only primary education. Further, students were five times more likely to be classified as wild meat consumers than retirees while other occupation types did not significantly influence consumption (Table 2). Current consumers ate wild meat on average about three times within the last year. Only personal monthly income affected slightly whether a person was a "frequent consumer" (i.e., wild meat consumption more than 3 times within the last 12 months) while age, education, and occupation were not significant (Table 3). A small odds ratio showed that respondents also had a slightly higher chance to be frequent consumers when their personal income was higher than 100,000 Vietnamese Dong (~5 $US). Current consumers reported that most often (72%) they had been accompanied by friends on their last wild meat event; 21% were accompanied by family or relatives and 7% by colleagues or business contacts. On average, about six people accompanied each event. In 145 cases (77%), current consumers reported that they ate wild meat in Hue city, and three times more often in restaurants (72%), than in non-public places ($\chi^2(2) = 104.5$; $p < 0.01$). Reasons for consumption were in most cases (Fig. 2) that respondents were invited by others (32%), ate wild meat out of curiosity (29%), or because it was "tasty" (27%).

3.2. Consumed species

Combined for all consumers, 27 wild animal species were reported to be eaten. Overall, current consumers ate 18 different wild animal species on their last occasion (Table 4) and on average, the consumers claimed to have eaten about 5 different wild animal species within their lifetime. The five most frequent wild species reported by current consumers on the last occasion were wild pig (*Sus scrofa*), wild goat (*Capra aegragus*), deer (*Cervus* or *Hyelaphus* spp.), bird and snake (Table 4). Identification of wild animal species during these occasions was difficult but was reconstructed based on different sources (interviews, restaurants, experts) and on the home range of the particular species (Xuan Dang, 2000; Drury, 2009; Forest Protection Department, 2011).

3.3. Consumption of farmed wildlife

Of all consumers, 65 (23%) claimed that they had tried farmed wild meat while 153 (56%) had never tried, and 59 (21%) of respondents did not know if they had tried it (Fig. 3). Respondents with the highest education level (graduates) significantly ate more farmed wild meat than people with the lowest education (Table 5). Generally, graduates were about six times more likely to consume farmed wild meat than those with no or primary school education. The most frequently consumed farmed wild species was wild pig (Table 4).The most cited reasons for not trying farmed wild meat were that there was no opportunity (in 55% of the cases), farmed wild meat was too expensive (15%), or it did not taste as good as wild meat (14%).

3.4. Restaurant interviews

From the 20 restaurants visited, 16 had wild meat on offer; each of these 16 offered wild pig, often also monitor lizard (*Varanus* spp.), civet (*Paradoxurus* or *Viverra* spp.) and water dragon (*Physignathus cocincinus*) on their menu (Table 4). Only two restaurants stated that they offered farmed wildlife. Government staff seemed to be the most

Table 2
Binary logistic regression and relation of explanatory variables with current wild meat consumers and non-consumers (n = 189). Income is shown in million VND; exchange rate: 100,000 VND = ~5 US Dollar (MBH Media, 2013). Odds ratios and 95% confidence intervals (CI) were calculated against according reference values.

Variables	Regression coefficient (± SE)	*p*-Value	Difference for odds ratio	Odds ratio	95% CI
Personal income	0.04 (0.02)	0.006**	0.1 mill VND	1.042	1.012–1.073
Education					
(Reference: none/primary)	1.031 (0.587)	0.079	Junior secondary	2.805	0.887–8.869
	1.153 (0.556)	0.038*	Secondary school	3.167	1.064–9.425
	0.211 (0.631)	0.738	Graduate	1.235	0.359–4.255
Occupation					
(Reference: retirees)	1.700 (0.821)	0.038*	Unemployed/student	5.474	1.096–27.335
	0.327 (0.717)	0.648	Skilled/unskilled	1.387	0.340–5.657
	0.098 (0.733)	0.894	Service worker	1.103	0.262–4.642
	0.322 (0.897)	0.719	Professional	1.380	0.238–8.005
Constant	−1.026 (0.732)	–	–	–	–

$R^2 = 0.581$ (Hosmer & Lemeshow); 0.117 (Cox & Snell); 0.180 (Nagelkerke). Model: $\chi^2(8) = 23.61$; $p = 0.003$, (n = 189).
* $p \le 0.05$.
** $p \le 0.01$.

frequent consumers in the restaurants (81% of the cases) and the most common reason stated in restaurants why wild meat was consumed was that it was "delicious" (75%), while on only few mentioned health improvement, new taste, or that wild meat was fashionable.

4. Discussion

4.1. Context of wild meat consumption

In our study, the higher the personal income a respondent had the more likely he was a wild meat consumer, as well as a frequent consumer. Students were also often identified as wild meat consumers. In Vietnam, young people often seem to eat wild meat out of the curiosity but they rarely become frequent and regular consumers (Thai Minh et al., 2011). Similarly, Zhang et al. (2008) found that in Southwest China, the most frequent wildlife consumers were male students with high income. There is an increasing tendency within the high and middle income class in Vietnam to regard bushmeat as a luxury and a status item. This in combination with a growing human population and increased buying power has all contributed to higher demand for wildlife products (Nijman, 2010). Wild meat is widely consumed by successful, high-income, high-status males of all ages and educational levels — and is used as a way of communicating prestige and obtaining social leverage (Drury, 2011). In our study, unemployed people were also significantly linked to the wild meat consumption. This "unemployed" consumer group might have had some informal employment, which they did not report in our study, but which is known to be present in rapidly developing urban areas in Asia (ILO, 2013). Our consumer profile, hence, provided information on the status and nature of demand and supply as an important prerequisite for designing of suitable conservation goals (Li and Li, 1998).

As the source of wildlife meat in Vietnam stems mostly from wild animal species native to National Parks and protected areas but also includes some wildlife species from neighbouring countries (Van Song, 2008) this information is crucial for sustainable protection regimes.

Ziegler (2010) indicates that bushmeat consumption in Central Africa increases significantly with personal wealth, expressed as GDP at purchasing power parity per capita. Furthermore, both fish and bushmeat exhibited the characteristics of superior goods in the Congo Basin since bushmeat sales were influenced by the wealth rank of the household (De Merode et al., 2004). Throughout much of West and Central Africa, it is certain that the growing urban population creates very substantial and significant natural resource demand shadows over forest areas, even hundreds of kilometres away (Ape Alliance, 1998).

The explanatory variables on income, occupation, and age tested in our study were not independent from each other but correlated to an extent. The highest Kendall's tau correlation coefficient was observed between the variables occupation and personal monthly income ($b = 0.536$). Hence, we analysed our factors separately in order to explore individual effects of explanatory variables.

The findings from restaurant interviews revealed that government employees were the most frequent customers. Moreover, businessmen and government staff were reported to have a higher likelihood to be

Table 3
Logistic regression showing one significant variable in relation to the frequent wild meat consumers (n = 140). Income is shown in million Vietnamese Dong (VND); exchange rate: 100,000 VND = ~5US Dollar (MBH Media, 2013). Odds ratios and 95% confidence intervals (CI) were calculated against according reference values.

Variables	Regression coefficient (± SE)	*p*-Value	Difference for odds ratio	Odds ratio	95% CI
Income	0.018 (0.009)	0.051*	0.1	1.018	1.000–1.036
Age	0.000 (0.017)	0.990	1 year	1.000	0.967–1.304
Education					
(Reference: none/primary)	0.134 (0.709)	0.850	Junior secondary	1.144	0.285–4.591
	−0.543 (0.738)	0.462	Secondary school	0.581	0.137–2.467
	−1.306 (0.955)	0.172	Graduates	0.271	0.042–1.762
Occupation					
(Reference: retirees)	−0.095 (1.406)	0.946	Unemployed/students	0.909	0.058–14.316
	0.241 (1.337)	0.857	Skilled/unskilled	1.272	0.093–17.489
	0.347 (1.327)	0.794	Service workers	1.142	0.105–19.081
	1.147 (1.307)	0.380	Professionals	3.150	0.243–40.814
Constant	−1.162 (1.849)	–	–	–	–

$R^2 = 0.887$ (Hosmer & Lemeshow) 0.113 (Cox & Snell); 0.157 (Nagelkerke). Model: $\chi^2(9) = 16.709$, $p = 0.53$ (n = 140).
* $p = 0.05$.

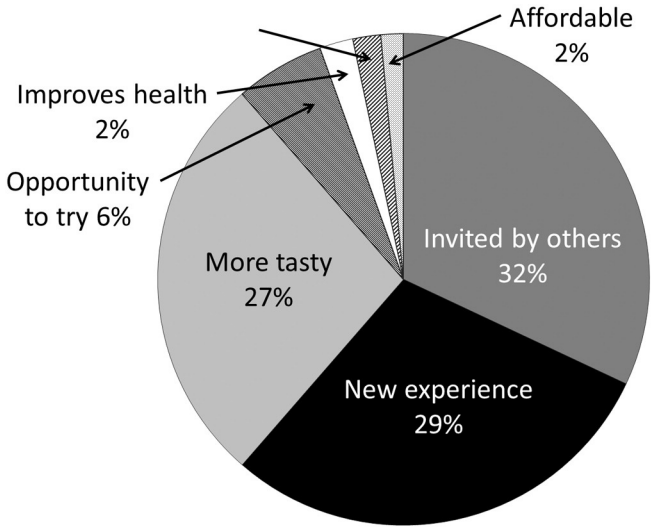

Fig. 2. Reasons for consuming or trying wild meat amongst current consumers of wild meat (n = 187, multiple responses possible).

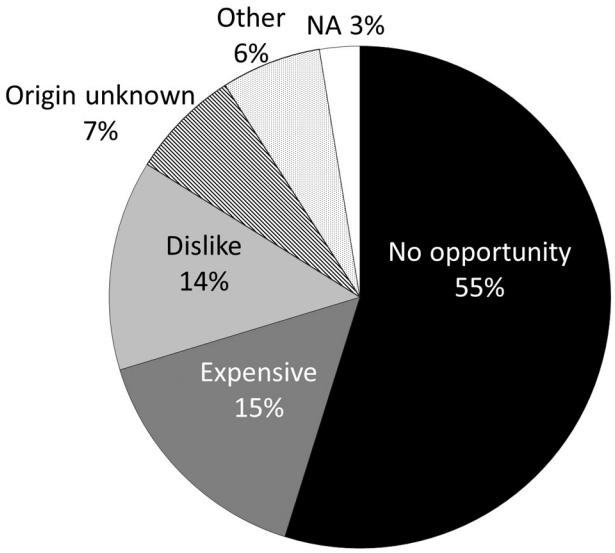

Fig. 3. Reasons for never having tried farmed wildlife (n = 153, multiple responses possible). NA = not applicable or respondents did not know.

Table 4
Identification of the consumed species, conservation status of genus and species (IUCN Red List, Decree 32), whether a species was farmed in Thua Thien Hue province in 2011[1] and the frequency of consumption amongst the current consumers on the last occasion. LC = least concern, NT = near threatened, VU = vulnerable, EN = endangered, CR = critically endangered; DD = data deficient, NE = not evaluated. Decree 32: Group IB = animals prohibited for exploitation; IIB = animal restricted from exploitation.

Common name	Scientific name	Farmed	IUCN	DEC. 32	Frequency[2]		Farmed tried[3]
					Survey	Restaurants	
Wild pig	*Sus scrofa*	Yes	LC	–	57	16	49
Wild goat	*Capra aegragus*	No	–	–	51	6	12
Deer	*Cervus nippon*	Yes	LC	–	25	5	3
	Cervus eldii	No	EN	IB			
	Hyelaphus porcinus	No	EN	–			
	Rusa unicolor	No	VU	–			
Bird	*Phasianus colchicus*	Yes	LC	–	12	3	–
	Centropus sinensis	No	LC	–			
	Gallus gallus	No	LC	–			
Snake	*Bungarus fasciatus*	No	LC	IIB	9	4	1
	Ophiophagus hannah	No	VU	IB			
	Naja naja	No	DD	IIB			
Water dragon	*Physignathus cocincinus*	No	NE	–	8	10	2
Serow	*Capricornis sumatraensis*	No	VU	IB	7	2	–
Civet	*Paradoxurus hermaphroditus*	Yes	LC	–	5	12	–
	Viverra zibetha	No	NT	IIB			
	Viverricula indica	No	LC	IIB			
Soft-shell turtle	*Pelodiscus sinensis*	No	VU	–	4	7	–
Forest chicken	*Coturnix* spp.	No		–	4	2	3
Forest frog	–			–	4	8	–
Porcupine	*Hystrixbrachyura*	Yes	LC	–	3	4	2
Muntjac	*Muntiacus muntjak*	No	LC	–	3	3	–
	Muntiacus vuquangensis	No	EN	IB			
Monitor lizard	*Varanus bengalensis/nebulosa*	Yes	LC	IIB	3	12	1
Pangolin	*Manis javanica*	No	EN	IIB	2	7	–
Turtle	*Cuora galbinifrons*	Yes	CR	–	1	5	6
	Cuora mouhotii	Yes	EN	–			
	Cyclemys tcheponensis	Yes	NE	–			
Wild rabbit	*Nesolagus timminsi*	No	DD	IB	1	1	–
	Lepus spp.	–	–	–			
Bamboo rat	*Rhizomys sinensis*	No	LC	–	1	1	–
Wild cat	*Prionailurus bengalensis*	No	LC	IB	1	–	–
Bear	*Ursus malayanus*	No	VU	IB	–	–	–
Gecko	–	No		–	–	–	–
Tiger	*Panthera tigris*	No	EN	IB	–	–	–
Monkey	*Macaca* spp.	No	LC–CR	IIB	–	–	–
Ostrich	*Struthio camelus*	No	LC	–	–	–	3
Crocodile	*Crocodylus porosus*	No	LC	IIB	–	–	2
	Crocodylus siamensis		CR	IIB			

[1] Forest Protection Department TTH, 2011, farmed wild animals in Thua Thien Hue province, unpublished manuscript; IUCN, 2012; MARD, 2006b.
[2] Frequency = number of times species was mentioned/a species was offered in the restaurant.
[3] Farmed tried reported refer to the consumption of the farmed wildlife that occurred at any time in life. Multiple answers were possible.

Table 5
Logistic regression analysis whether education influenced the likelihood of whether a respondent was a farmed wild meat consumer (n = 273). Odds ratios and 95% confidence intervals (CI) were calculated against according reference values.

Variables	Regression coefficient (±SE)	*p*-Value	Difference for odds ratio	Odds ratio	95% CI
Education					
(Reference: none/primary)	0.916(0.600)	0.127	Junior secondary	2.500	0.771–8.110
	0.947(0.586)	0.106	Secondary school	2.579	0.818–8.130
	1.725 (0.581)	0.003*	Graduates	5.614	1.798–17.529
Constant	−2.251(0.526)	–	–	–	–

$R^2 = 1.00$ (Hosmer & Lemeshow), 0.05 (Cox & Snell), 0.07 (Nagelkerke). Model $\chi^2(3) = 12.6$; $p < 0.05$ (n = 273).
* $p \leq 0.01$.

wild meat consumers, which was also found in previous studies conducted elsewhere (Drury, 2009; Crudge et al., 2010; Huyen et al., 2011). Similar to our results, restaurants in Hanoi were a main location where respondents travelled to consume wild meat (Drury, 2009). Various kinds of restaurants in Ho Chi Minh City were also found to be a prevailing venue for wild meat consumption (Huyen et al., 2011).

The street survey revealed that 18 wild animal species were consumed on the last occasion amongst the current consumers, and these 18 were also on the list offered in restaurants, which highlights restaurants as a good indicator for species consumed frequently amongst Hue citizens. The most commonly consumed species both reported in restaurants as well as by consumers was wild pig, followed by wild goat, deer and bird. However, species identification was a rough estimation based on previous sources and expert opinions. Wild rabbit (*Nesolagus* or *Lepus* spp.), for instance, had been reported to be mistaken for a domestic rabbit, as argued in previous studies (Drury, 2009). Some species such as wild goat could have also been misidentified by the respondent and could in fact have referred to serow (*Capricornis sumatraensis*), or to "domestic goat" recently introduced in the meat market (Drury, 2009). Still, there was a clear tendency to perceive "wild goat" as a wild animal amongst consumers, restaurant staff and owners. In addition to wild pig and deer species, civet, deer, water dragon and soft shell turtle (*Pelodiscus sinensis*) were reported in the study. None of these species appears to be dependent solely on dense forest vegetation. Wild pig, civet and deer live in forested and in open areas, with wild pig and civet often being found near human settlements (IUCN, 2012). Water dragon lives in forested habitats in a vicinity of water bodies (Bond, 2013) and soft shell turtle depends on fresh water systems (Ernst et al., 2006). Hence, these species might be highly vulnerable to being caught in rather easily accessible areas, which will threaten their survival in the long run. The species offered in restaurants during the time of the study were similarly mentioned in other restaurant investigations in TTH province (Nguyen et al., 2010; Crudge et al., 2010). Furthermore, Crudge et al. (2010) found that restaurant customers did not specifically ask for rare species, which was supported by our findings; the most frequently offered and consumed species was wild pig, a species of least concern in the IUCN list (Table 4).

4.2. Consumption of farmed wild animals

Our study showed that only 23% of all consumers ever tried farmed wild meat while the majority of the respondents claimed to have had "no opportunity" to try. This corresponds with our findings from the restaurant interviews where most owners denied the sale of farmed wild animals. As farmed meat is more expensive than wild meat and because wild meat is still relatively easy to get, also from neighbouring countries, this proportion is probably an underestimate. A study in Hanoi conveyed that it was very difficult to tell the difference in taste between farmed wild animals and those caught in wild (Drury, 2009). This might be reflected in our study by the 21% of all consumers that did not know whether they tried farmed wild meat. Our results showed that graduates were significantly more likely to have tried farmed wild meat than any other education category. According to Drury (2009), education was found to be positively correlated to the awareness and general knowledge about wildlife and its protection status. Further, in our study consumers who had never tried farmed wild meat claimed that it was expensive. A study on conservation impacts of porcupine farming in Vietnam reported that farmed meat was more expensive than that from wild caught animals, which is discouraging restaurants to purchase farmed wild meat (Brooks et al., 2010). The higher prices of farmed wild animals are due to time and money investments needed for infrastructure, feed and medication, which one does not need when hunting (Mockrin et al., 2005). Further, farmed animals could have been illegally exploited from forests, which can be expected when trade of wild caught animals is prohibited (Bulte and Damania, 2005). Hence, the attractivity of farmed wild meat from both demand and supply sides seemed low.

4.3. Law enforcement, problems and potentials

The consumption of wild meat is prohibited by law in Vietnam (MARD, 2006a, 2006b, 2007, 2009, 2012; The Prime Minister, 2012; The President, 2004, 2005, 2008; National Assembly, 1999, 2009). However, there is no legal mechanism that enforces this law by punishing wild meat consumers (as also indicated by Crudge et al., 2010). In Malaysia (Bennett and Rao, 2002), the trade in wild meat was mostly geared towards urban consumers where intensive education, enforcement programmes, and the support and inclusion of rural communities whose livelihood was entangled with the wild fauna and flora, were applied. In Vietnam, there have been several government/NGO projects and campaigns aiming at wildlife protection, alongside with law enforcement improvement and livelihood concerns (Thai Minh et al., 2011; ENV, 2013; WWF, 2013). Our study can be used to contribute knowledge to wild meat consumption patterns as a base for these activities and further tackle necessary conservation efforts based on our knowledge on wild meat demand and availability.

When interpreting our results we need to consider trustworthiness of the responses as wild meat trade and consumption is illegal in Vietnam. This might have led to under-reporting of the consumption in spite of the anonymous nature of the survey. Hence, our data must be interpreted with caution. When assessing poaching activities in Serengeti, Knapp et al. (2010), indicated that the people were not likely to fully report their involvement in illegal activities. However, wild meat consumers in Vietnam are not punished financially for consumption, according to the Decree 99 (MARD, 2009). Therefore, as well as proven by the high number of people admitting wild meat consumption despite its illegality, the results were probably largely accurate, and respondents gained trust in the interviewers during the questionnaire. Further, we asked similar questions throughout the interview (Connaway and Powell, 2010), which helped us to assess whether the answers were consistent and trustable. However, our results only describe the consumption pattern amongst male Hue residents who may not display the same consumption characteristics as women in Hue or the population elsewhere in Vietnam. The overall consumption rate of wild meat amongst men in Hue (85%) showed that this type of food is not only reserved for a small and privileged part of the society. This percentage represents 28% (i.e. from the proportion of males) of the total population of 338,994 residents in Hue (Hue City, 2013). If this proportion of

people consumes wild meat on average 3 times per year, it is questionable whether tropical forests of TTH or Indochina will be able to sustain this demand in the long run. A loss in biodiversity has been observed already (Duckworth et al., 2012), which was probably caused by an increasing population (CIA, 2013), by high wild animal extraction rates, and by a globally high logging rate (Sodhi et al., 2010) reported for Vietnam.

5. Conclusion and recommendations

The aim of this study was to discover the extent of the current wildlife consumption, including farmed wildlife consumption, and the consumers' profile in Hue city. In addition, the study investigated the wild animal species composition of consumed wildlife. The study was a pioneer study regarding the random sampling method applied to ascertain the extent of wild meat consumption amongst the Hue male general public, which shed light on the current consumer behaviour and consumer profile in Hue.

Almost 60% of our respondents were "current consumers" and these consumers had a relatively high income and a higher education degree compared to non-consumers. A commonly available and eaten species was wild pig (*S. scrofa*). The most common location for consumption was in restaurants, and restaurants represented a good indicator for species consumed amongst the general public in Hue. Farmed wild meat was rarely tested by our respondents (less than 25% of the respondents had ever tried it). Based on our findings we proclaim that more research should be conducted about a potential substitute for wild meat, i.e., of products other than those from wildlife farms as farmed wild meat did not seem to be accepted/valued by most consumers. The high number of respondents claiming to have eaten wild meat show that besides the enforcement, regular theoretical and practical education in schools and stronger communication campaigns should be conducted, aimed at all stakeholders.

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