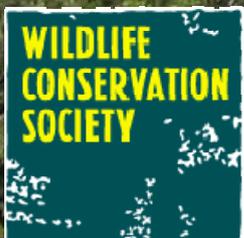


HOUSEHOLD LIVING STANDARDS OF COMMERCIAL HUNTERS AND WHOLESALE WILDLIFE TRADERS IN VIETNAM

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I. INTRODUCTION

South-east Asia is a globally important region in terms of species richness and endemism, supporting four biological hotspots (Brooks et al. 2002) and holding a range of newly-discovered and taxonomically unique species of fauna and flora. Hunting for both subsistence and trade is a key driver of biodiversity loss across this region (Sodhi et al. 2004) which contains almost one quarter of the world's globally-threatened mammalian and avian species (IUCN 2008). Many species are experiencing range-restrictions which has led to a number of countries experiencing national extirpations.

Vietnam, on the eastern border of mainland South-east Asia, is witnessing loss and population declines across many taxon groups at a rapid rate. There are a number of species already extinct or with such low populations that many conservationists consider them effectively extinct. These include the kouprey (*Bos sauveli*) (Duckworth and Hedges 1998), wild water buffalo (*Bubalus bubalis*) (Hedges 1996), Eld's deer (*Cervus eldii*), hog deer (*Cervus porcinus*) (Ratajszcak 1991), Siamese crocodile (*Crocodylus siamensis*) (Platt and Ngo 2000), Mangrove terrapin (*Batagur baska*) (Stuart et al. 2001), and the Javan rhinoceros (*Rhinoceros sondaicus annamiticus*) (Stroose and Van Strein 1997).

Although habitat loss and disturbance have added to these declines, the primary driving force of species loss in Vietnam is from unsustainable hunting and trade. Vietnam is a key country in the Southeast Asian wildlife trade network acting as a source, consumer and transit country (Compton & Le Hai Quang 1998; Bell *et al.* 2004; Anon 2005; Lin 2005). This has occurred despite legislative controls prohibiting the sale, advertisement, storage and slaughter of wildlife without permission from government authorities (Decree 32/2006/ND-CP and Decree 159/2006/ND-TTg).

Information from research and seizures indicate

that wildlife trade and consumption are high in urban areas, often coordinated by organised criminal networks and sourced throughout the region, in addition to Africa, for subsequent sales across the globe (Compton & Le Hai Quang 1998; Nguyen 2003; Bell *et al.* 2004; TRAFFIC 2006; Robertson & Bell in prep). Vietnam's position in the global wildlife trade is clear from trade activity reported through CITES permits. In 2005-06 alone, Vietnam imported more than 60,000 hard-shell freshwater turtles for re-export to China. Furthermore, over the ten year period 1996-2006, Vietnam exported an average of 15,000 macaques and 150,000 pythons to countries in Asia, Europe as well as the USA (CITES/UNEP 2008). Although accurate, national-level data on the illegal trade are limited, research in central Vietnam highlighted the significant trade in wild meat at urban restaurants, estimating that up to 2 million kg could be consumed each year (Robertson 2007).

The wildlife trade chain operating in Vietnam is complex and involves a number of intermediaries from the point of supply to the final consumer of the wildlife (Figure 1). Studies have found Vietnamese hunters either hunting within Vietnam's remaining forests or travelling illegally across the border to hunt in Laos or Cambodia (SFNC 2003, Robertson 2007). Wildlife is also sourced into the

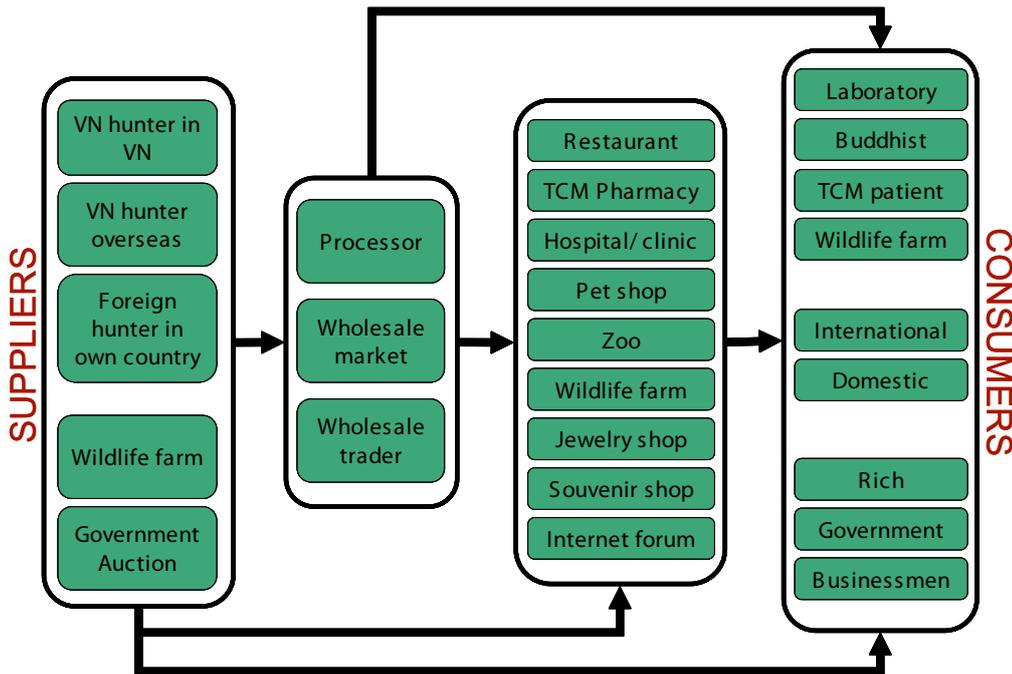


Figure 1: Simplified diagram of the key actors in the Vietnamese wildlife trade chain

Vietnamese trade chain from foreign hunters (e.g., Khmer, Laotian, Burmese and Thai) that hunt within their own countries and sell to Vietnamese traders (e.g., Nooren & Claridge 2001). Wildlife also enters the trade from commercial wildlife farms within Vietnam and from government auctions of seized wildlife.

Wholesale traders (the middlemen in the system) and the markets form the ‘bottlenecks’ of the trade chain, often sourcing wildlife from a number of supply points and providing services to the producers which make them an indispensable part of the trade network (e.g., wildlife transportation, financial loans, equipment, bribes to law enforcement agencies, access to retailers). For some wildlife products (e.g., medicines, jewellery, skin mounts) the skills to process these products is often a critical role of these wholesale traders.

Although both suppliers and wholesale traders do in some cases sell directly to consumers, the main end-use dealers or retailers for wildlife in Vietnam are restaurants, traditional medicine pharmacies/clinics, wildlife farms, pet shops, zoos, souvenir shops, and jewellery shops.

Consumers of wildlife through the Vietnam wildlife trade network are varied, and are both Vietnamese and other nationalities. Market research has shown that key Vietnamese consumer groups for illegally traded wildlife

products are urban-based, wealthy, businessmen or government officials, and male (e.g., Robertson 2007, TRAFFIC 2007).

At a broad level, interventions to reduce the illegal trade in wildlife can include prohibition/regulation of the trade or substitution of wildlife as the traded product. The most common tools to achieve these are policy, law enforcement and awareness which can be directed at individual actors along the trade network or aimed to impact the whole trade chain.

Overseas investment to Vietnam to tackle the illegal wildlife trade since the mid 1990’s is in the order of millions of US dollars. Vietnam is a party to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), a member of the ASEAN Wildlife Enforcement Network, has a five-year national action plan on strengthening control of illegal wildlife trade and has issued over 100 legislative documents to support Forest Protection Department rangers, police, customs, and market controllers in combating this illicit trade. Nonetheless, there is consensus among the scientific and NGO community, as well as many government departments and law enforcement agencies, that the illegal wildlife trade in Vietnam is increasing in volume and species affected, and that further species extinctions will continue over the next decade unless

more effective action is taken.

Many interventions to date have not been designed and implemented based upon reliable data, but on assumptions about the wildlife trade dynamic and the actors from surveys limited in scale and time. Improving the design requires a more thorough understanding of each actor in the trade chain and the costs and benefits to participation in the illegal wildlife trade. Furthermore, an understanding of each actor's dependence and level of livelihood vulnerability is critical to design effective interventions that do not increase threats to the livelihood security of rural populations.

Commercial wildlife breeding farms provide an example of a supply-side trade intervention where the assumption betrays the reality of the impact. Wildlife farms have the strong support of many governments in East and Southeast Asia who state that they reduce hunting pressure by offering a legitimate, lower-cost supply and substitute hunted wildlife, which reduces pressure on wild populations. Proponents also claim wildlife farms improve food security and alleviate poverty in rural areas. However, a WCS study in Vietnam investigating the impact of wildlife farms on the conservation of wild populations found that under current management and control, farms actually presented a threat to the very survival of wild populations. The study also highlighted that given the highly variable market price fluctuations of wildlife, the limited knowledge on husbandry and veterinary care (including the risks from zoonotic diseases), weak institutional support structures, and environmental risks associated with exploitation of wild populations and animal escapes, wildlife farming is unsuitable as a tool for improving livelihoods in comparison to other available rural livelihoods strategies (WCS 2008).

Given these uncertainties, a study of the core socio-economic drivers of the wildlife trade in Vietnam was undertaken. A number of actors in the wildlife trade network could have been the focus for this study (Figure 1). We selected Vietnamese commercial hunters and wholesale wildlife traders for assessment because:

- Vietnamese commercial hunters are a key supplier of wildlife into the trade and there have been no studies at a national level into their livelihoods and dependency on wildlife trade.
- Studies over the last 10 years have repeatedly highlighted wholesale wildlife traders as key points for intervention, yet policy, enforcement or communication campaigns still fail to target them, and they are yet to be studied in any detail.
- Wildlife farms and the related conservation issues surrounding their operation and livelihood implications in Vietnam were studied by WCS recently (WCS 2008).
- Consumers of wildlife products in Hanoi are the focus of a PhD study currently underway by a student from Imperial University, England, that in combination with previous work by ENV (2005) and TRAFFIC (2007) should provide more reliable data on the drivers for consumers of wildlife.
- Retailers of wildlife (e.g., restaurants, TCM shops, pet shops) were considered for this study and do represent a gap in our knowledge base. However, with limited resources for this study we selected Vietnamese commercial hunters and wholesale wildlife traders over retailers at this time.

This study aimed to provide quantitative data characterizing the social and economic characteristics of Vietnamese commercial hunters and wholesale wildlife traders at a household level that will assist formulating and revising interventions for tackling the illegal wildlife trade. The study was conducted in two parts: commercial hunters, and wholesale traders. The aim of both was to understand the livelihoods implications of the trade, and hence know how to design interventions which reduced illegal and unsustainable trade while not having detrimental impacts on vulnerable livelihoods.

2. HOUSEHOLD LIVING STANDARDS OF COMMERCIAL HUNTERS IN VIETNAM

Scott. I. Robertson & Truong Thi Thu Trang

The Living Standards Measurement Study (LSMS) was established by the World Bank in 1980 to improve the type and quality of household data collected by government statistical offices in developing countries for policy design and greater understanding of policy impacts (Grosh & Glewe 1995). LSMS surveys are characterised by multi-topic questionnaires and extensive quality-control features. Data are collected on a range of features of the household including consumption, income, savings, employment, health, education, nutrition, and housing to assess the household's welfare, behaviour and to evaluate the impact of government policies on living standards.

Vietnam has regularly carried out LSMS surveys, known in-country as Vietnam Household Living Standard Surveys (VHLSS), since 1992 across the country, collecting data from thousands of households. Data are available from the General Statistics Office of Vietnam from the income and expenditure surveys carried out in 1992/93 (4800 households), 1997/98 (5994 households), 2001/02 (30,000 households), 2003/04 (9000 households), and 2005/06 (9189 households). Data on income alone are collected from an even higher number of households (e.g., 45,945 households in 2006).

The administrative divisions in rural Vietnam are split into four main levels: Province, district, commune and village. Urban cities are split into districts, wards and blocks. Similarly, urban provincial capitals and towns are split into wards and blocks. The principal sampling units for the VHLSS were urban wards and rural villages of which there are roughly 10,000 throughout the country. Approximately 300 of these were selected, from which two villages/blocks were then selected and finally 20 households from each village. Sampling is stratified into two groups urban and rural, with sampling carried out in each group equal to the propor-

tion of urban and rural households across the whole country following the most recent national census (e.g. 30% urban, 70% rural). Communes are selected to ensure coverage across all regions of Vietnam and in all three urban domains (city, provincial capital, and provincial towns). Further details of the sampling techniques and methods can be found in World Bank (2001).

These surveys are considered to constitute the largest, most nationally-representative dataset by World Bank economists and researchers and in terms of national-level datasets on household income and expenditures are arguably the most extensive and reliable of their kind (Glewe *et al.* 2004).

The VHLSS adopt quality-control measures developed by the World Bank LSMS which include the following measures to reduce error and increase reliability: Questions written exactly as they should be asked in the questionnaire; suggested questions for further probing printed on the questionnaire; pre-coded, close-ended responses; in-depth training of interviewers with formal supervision; data collection carried out in two rounds so data from the first round can be checked for consistency and followed up

in the second round of interviews; data entered directly into the computer from the completed questionnaire, without transcribing codes; and finally data is managed by a custom-made software program that has built in consistency checks during data entry.

The questionnaire is split into eight general sections covering the following areas: Household demographics; education, training and vocational training; health and healthcare; income (employment, agricultural, forestry and aquaculture activities, and non-farm employment); expenses (Food and non-food); fixed assets and durable goods; accommodation and housing; and participation in poverty or hunger eradication programs.

This study originated from the forestry income section of the questionnaire where households are asked to report income from 'hunting and taming wild birds and animals' (Question 4B4). Through this we were able to identify commercial and subsistence hunters in Vietnam and understand the social and economic characteristics of their participation in the wildlife trade.

We extracted all households that reported an income from 'hunting and taming wild birds and animals' (4B4.1, 66) from the 2006 VHLSS dataset of 45,945 households. This included data on value of the hunted wildlife and income there from in the last 12 months (4B4.1 66), the amount that was for sale or barter (4B4.1 66-4), and the total expenditures on hunting, taming wild birds and animals (4B4)

We recognised that the term "taming" in this as income section could cause confusion and were cautious that commercial wildlife farm owners could be mixed in with commercial hunters in this section. Therefore, we also extracted data on total expenditures on 'Other livestock' breeding (4B2.2, 10) which includes wildlife, goats and dogs. This allowed us to separate those hunting from those 'taming' based on the assumption that those taming would have expenditures on animal care. We were likely to lose some households that were raising non-wildlife 'other livestock' (e.g. goats and dogs) but decided that it was the most reliable method to ensure we were only looking at commercial hunters (i.e. hunters who report wildlife provides a source of income).

For these households we then extracted the following

associated data on demographics (Province, district, commune, urban/rural, ethnicity); Education (education level attained of household head and the highest diploma attained in the household); income (total household income in past 12 months, by summing sections 4A,B,C,D excluding income from '4B4.1,66-Hunting and taming wild birds and animals'); wealth (Total annual expenditure on food, drinks and non-food items (only available for 9189 of the 45945 households), total current value of fixed and durable assets, and participation in poverty reduction program) and food security (Monthly quantity of domestic meat, fish, shrimp and other seafood consumed).

Despite the reported quality of these household data, there are weaknesses that need to be acknowledged when appraising the results of this analysis. Firstly, as wildlife trade is considered an illegal activity, many households may have reported only their hunting activities, but not wildlife trading activities, to the VHLSS researchers. However, it is possible the households may have perceived low threat from discussing these activities with the VHLSS researchers. In fact, livelihood surveys have even been used as role-play stories when conducting hunting surveys in Vietnam (e.g. SFNC 2003). Secondly, households are reporting on the value of wildlife, not quantity, which they hunt. Therefore, there may be instances where households that hunt small amounts of high-value wildlife species (e.g. pangolins, hard-shell turtles, tigers) report much higher value of wildlife hunted than a household hunting large quantities of relatively low-value wildlife (e.g. snakes, civets, deer). Although the VHLSS questionnaire at present does provide some compelling data, some small changes could greatly improve data quality in the future analysis of hunting and wildlife trade:

- Separation of the term 'taming' and 'hunting' of wildlife
- Reduce the recall period for hunting value from 12 months
- Separation of wildlife to its own category in all sections where it is included among 'other livestock' and 'other meat'
- Replace the term taming with commercial wildlife breeding and request to specify species and products
- Inclusion of data on species, quantities as well as

Ethnicity	No. HH's	Ethnicity	No. HH's
Kinh	76	Co tu	3
Gie-trieng	20	Kho Me	3
Xo-Dang	20	X'tieng	2
Thai	13	Bru-Van Kieu	1
Dao	12	Co Ho	1
Tay	12	E de	1
Ba Na	8	Ma	1
H'mong (Meo)	7	Muong	1
Nung	7	Ra-glai	1
San-diu	4	Tho	1

Table 1: The frequency of different ethnic groups for commercial hunting households identified in the VHLSS 2006 surveys

prices for wildlife hunted

Nonetheless, the extensive sampling of households across the country, data-quality controls and inclusion of basic data on hunting and wildlife trade, provide justification to extract and analyse this data to characterise the social and economic features of commercial hunting households, evaluate their dependence on wildlife trade and investigate what drives these households to trade wildlife.

Who is commercially hunting wildlife in Vietnam?

448 households reported hunting and taming wildlife of which 32 of those reported expenditures on raising 'other livestock' so were omitted. Therefore, a total of 416 households were remaining that were determined to be hunting wildlife (0.9 % of the total 45,945 households surveyed). Of these hunting households, 194 reported selling wildlife (0.42% of the total 45,945 households surveyed), which gives us our final sample of commercial hunters for this analysis.

The total value of wildlife hunted by these households in the last 12 months ranged from 90,000–20–,160,000 VND (\$5.45–\$1222¹) with a mean per household of 1,482,260 VND (\$89.83) (±SE:156,209) per household. These commercial hunting households sold between 13–

1 Unless specified VND values are converted to US\$ amounts at an exchange rate of 16500 VND: US\$1

Education level attained of HH head	No. households	%
No education	36	31%
Primary	51	44%
Lower secondary	24	21%
Upper secondary	6	5%

Table 2: The frequency of education level attained by heads of commercial hunting households identified in the VHLSS 2006 surveys

Highest diploma attained in household	No. households	%
No education	33	17%
Primary	97	50%
Lower secondary	46	24%
Upper secondary	18	9%

Table 3: The frequency of highest education diploma's attained in commercial hunting households identified in the VHLSS 2006 surveys

100% of the wildlife hunted with a mean per household of 77.1% (±SE 1.87). In the last 12 months these households spent up to 4,300,000 VND (\$260) on hunting with a mean per household of 214,250 VND (±SE 38,039). We found a significant positive relationship between the total value of hunted wildlife sold and total annual expenditures on hunting ($y=0.5x + 1.9, r^2 = 0.26, P<0.0001$).

A total of 118 (60.8%) of the households commercially hunting wildlife were from an ethnic minority group, with the remaining 76 (39.2%) of Kinh ethnicity (the majority ethnic group in Vietnam). A total of 20 ethnic groups of Vietnam's 54 were represented (Table 1). Only 11 of these households were in urban areas, the remaining 183 all rural-based.

Households receiving the government classification as poor represented 31.4% (61/194) of the commercial hunting households with 59 of these in rural areas and two in urban locations. Therefore, of the total VHLSS sample of 45,945 households only 0.1% were rural-poor commercial hunters of wildlife.

The wealth of these households varied greatly in each

Figure 2 (right): The relationship between the proportion of a household's total income and the total value of wildlife hunted in the past 12 months in Vietnam 2006. NB: $y=0.02x^2 + -0.09x^3 + 0.17$; $r^2=0.62$; $P<0.001$; 95% individual CI.

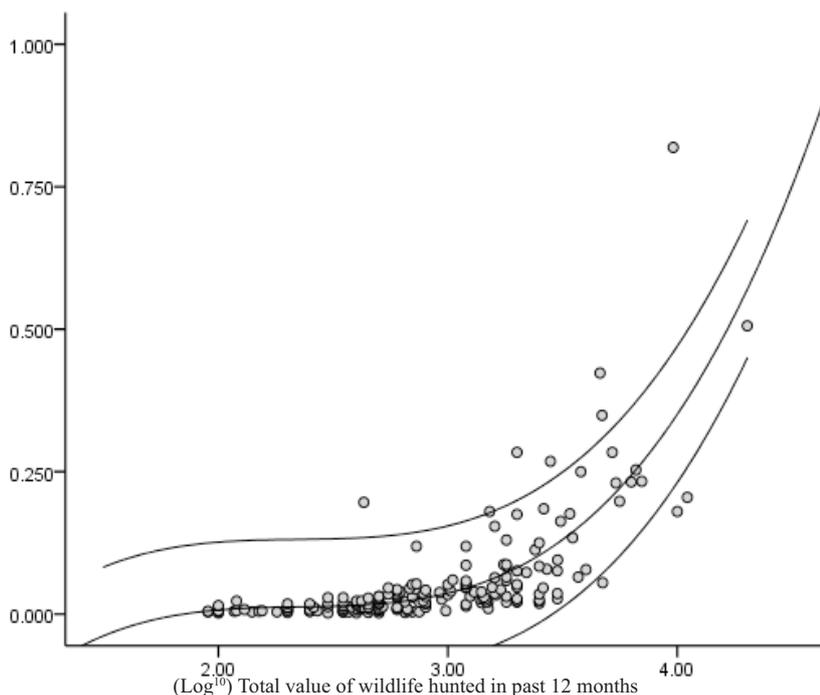


Table 4 (below): Descriptive statistics for the proportion of household's income from wildlife sales of commercial hunting households identified in the 2006 VHLSS by area, poverty classification and ethnicity.

of the variables we collected to measure this. Annual household expenditures (food and non-food) ranged from 6,820,280 VND – 27,841,890 VND (\$413–\$1,687) with an average of 15,227,009 VND (\pm SE 750,720) (\$923). The total value of fixed and durable assets of households identified as commercially hunting wildlife ranged from 700,000 VND – 657,600,000 VND (\$42 - \$39,855) with a mean per household of 29,275,484 VND (\pm SE 6,171,987) (\$1,774). Our final wealth variable was household income from the last 12 months. This ranged from 2,041,000 VND – 110,953,000 VND (\$124 - \$6,724) with a mean per household of 27,360,390 VND (\pm SE 1,409,805) (\$1,658).

The monthly quantity of domestic meat consumed by households ranged from 7-398.5kg with a mean per household of 108.5kg (\pm SE 12.45).

The education level of the household head was only recorded for 84 of the households identified as commercially hunting wildlife. The highest education level attained

Variable	Area	N	Min.	Max.	Mean	\pm SE	Std. Dev.
Not poor	Rural	124	0.002	0.819	0.06	0.01	0.10
Not poor	Urban	9	0.004	0.268	0.10	0.04	0.11
Poor	Rural	59	0.002	0.506	0.05	0.01	0.09
Poor	Urban	2	0.018	0.046	0.03	0.01	0.02
	Rural	183	0.002	0.819	0.06	0.01	0.09
	Urban	11	0.004	0.268	0.08	0.03	0.10
Not poor		133	0.002	0.819	0.06	0.01	0.10
Poor		61	0.002	0.506	0.04	0.01	0.09
Kinh		76	0.002	0.819	0.10	0.02	0.13
Ethnic minority		118	0.002	0.233	0.03	0.00	0.04

was Upper secondary, with the majority (51/117, 44%) only completing primary school (Table 2). All 194 households reported the highest education level attained within the household. None of the members of these commercial hunting households completed education further than upper secondary school, with 33/194 (17%) completing no education at all (Table 3).

Do the livelihoods of commercial hunters depend on wildlife?

A common measure to a household's dependency on wild-

life as a source of income is the proportion of their income accounted for by wildlife sales. The VHLSS 2006 dataset indicates that the greater majority of households reporting commercial hunting are not dependant on wildlife as a source of income.

The proportion of household income from wildlife sales ranged from 0.2%-81.9% with a mean per household of 5.7% (\pm SE 0.68). A total of 192 households (98.9%) reported that wildlife income accounted for less than 50% of their overall income leaving only two households reporting a proportion over 50% (one at 50.6% and four at 81.9%).

We found a highly significant, positive relationship between the proportion of a household's income from wildlife sales and the total value of wildlife hunted ($r_s = 0.79$, $n=194$, $P<0.0001$) (Figure 2), the total value of wildlife sold ($r_s = 0.83$, $n=194$, $P<0.0001$) and expenditures on hunting ($r_s = 0.58$, $n=175$, $P<0.0001$). These results highlight that the more investment a household puts into hunting and the greater value of wildlife they hunt and sell; the more important hunting is as a means of livelihood.

Splitting the households by area (i.e. rural or urban), poverty classification and ethnicity, we found a significant difference in the proportion of household's income from wildlife sales between households classified as poor and non-poor households ($U_{61,133}=3219.5$, $p<0.05$) with non-poor households having a greater proportion of their household income from wildlife sales. We also found a significant difference in the proportion of household's income from wildlife sales between households of ethnic minorities and those Kinh ethnicity ($U_{76,118}=2680$, $p<0.0001$), with the latter having a greater proportion of their household income from wildlife sales. However, we found no significant difference between the proportion of a household's income from wildlife and if they were urban based or rural ($U_{183,11} = 892$, NS) (Table 4).

However, our analysis also indicate that as the proportion of a household's income from wildlife sales increases, the wealth of that household decreases. We found a significant negative relationship between the proportion of a household's income from wildlife sales and the total value of fixed and durable assets ($r_s = -0.21$, $n=128$, $P<0.05$) and total expenditures on food and non-food products ($r_s = -0.36$, $n=50$, $P<0.05$).

In terms of food security, the data indicate that as the proportion of a household's income from wildlife sales increases, the food security (measured by quantity of domestic meat consumed) of that household decreases. We found a significant negative relationship between the proportion of a household's income from wildlife sales and the monthly quantity of domestic meat decreased ($r_s = -0.29$, $n=50$, $P<0.05$).

What drives people to commercially hunt wildlife?

Trade drivers can be thought of as the root causes for people to be involved in the wildlife trade. These are varied and many for the different actors in the trade network from suppliers to consumers. The VHLSS dataset provides us with socio-economic data on commercial hunters and their practice that may highlight certain drivers linked to their livelihoods e.g. poverty, food insecurity, wealth, culture and education.

a) Does poverty or wealth drive households to sell a greater value of wildlife?

We found no direct relationship between the value of wildlife a household sells and either their annual food and non-food expenditures and fixed and durable assets. However, we found a significant positive relationship between the value of wildlife a household sells and their income in the previous 12 months ($y=0.35x + 1.2$; $r^2=0.03$; $P<0.05$), indicating that wealthier households sell a greater value of wildlife. We also found a significant difference between the value of wildlife sold between households classed as not poor (Mean: 1,404,080; \pm SE 161,145) and those classified as poor (Mean: 905,690; \pm SE 320,518) ($t_{192}=3.8$, $P<0.0001$).

b) Do more food insecure households sell a greater value of wildlife?

There was no significant relationship between the monthly quantity of domestic meat a household consumes and the value of wildlife they trade.

c) Do ethnic minorities sell a greater value of wildlife?

We found that Kinh ethnicity households sold significantly

more wildlife than those of ethnic minorities ($t_{192}=5.9, p<0.0001$). The 118 ethnic minority households commercially hunting wildlife sold a mean value of 684,030 VND ($\pm 79,831$) in the last 12 months whilst Kinh ethnicity households sold a mean of 2,122,010 VND ($\pm 339,944$).

We compared the value of wildlife sold between the different ethnic groups where $n>3$ and found a significant difference between the groups ($F_{9,169}=5.3, P<0.0001$). Post-tukey analysis highlighted this difference to be between Kinh households and those from Gie Trieng, H'mong, San Diu and Xo Dang ethnic groups; and also between San Diu households and those from Gie Trieng and H'mong; where the former sold significantly more wildlife than the latter, in both cases.

d) Do less educated households sell a greater value of wildlife?

We found a significant difference in the value of wildlife sold and the highest level of education attained in the household ($F_{3,190}=6.1, P<0.005$). Post-tukey analysis highlighted this difference to be between households attaining upper secondary school education and both those only reaching primary school, and those with no education.

How do commercial hunters differ from subsistence hunters?

We examined the possibility that the drivers for wildlife trade may emerge by comparison of subsistence hunting households (i.e. those who reported hunting yet did not sell any wildlife) and commercial hunting households.

We found a significant difference between the commercial hunting and subsistence hunting households in terms of the total value of wildlife hunted ($T_{375,332}=-11.97, P<0.0001$) with the mean value in commercial hunting households (Mean: 1,482,260VND $\pm 156,209$; US\$89.83) greater than that of subsistence hunters (Mean: 390,430VND $\pm 45,731$; US\$23.26) (Figure 3).

In terms of household wealth, we found no significant difference between commercial and subsistence hunting households and their annual food and non-food

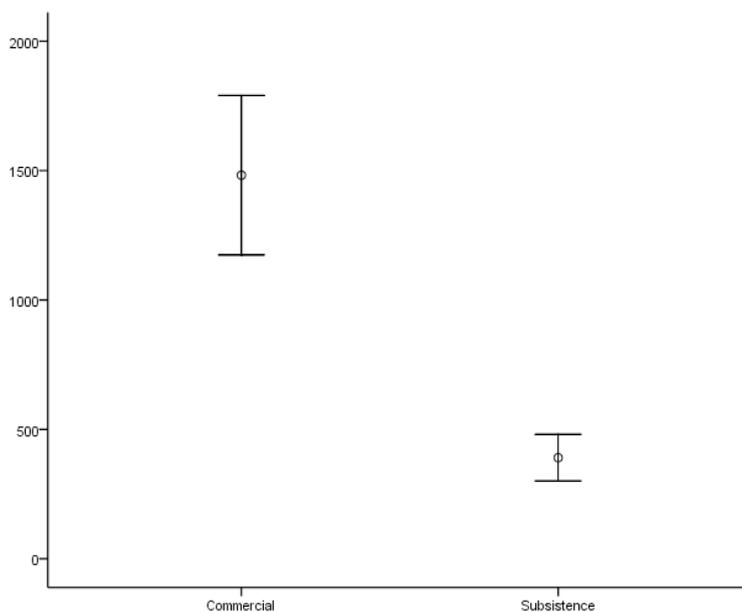


Figure 3: Error bars showing the mean (95% CI) value of wildlife hunted between commercial hunting and subsistence hunting households from the VHLSS 2006 dataset

	Subsistence hunting	Commercial hunting
Kinh ethnicity	54	76
Ethnic minority	168	118

Table 5: The number of Kinh and ethnic minority households reporting subsistence or commercial hunting in the VHLSS 2006 survey

expenditures, value of durable and fixed assets or their income from the last 12 months. We also found no difference in the number of households classified as poor between commercial and subsistence hunting households. Similarly, we found no significant difference between commercial and subsistence hunting households and the monthly quantity of domestic meat they consume.

With relation to household demographics, we found no difference in the number in rural or urban areas between commercial and subsistence hunting households. However, we did find a significant difference between the number of households of ethnic minority or Kinh ethnicity and if they were commercially hunting or subsistence hunting ($X^2_1=9.95, P<0.0005$) (Table 5).

Discussion

We identified 194/45,945 households (0.42%) to be commercially hunting wildlife. The majority of commercial hunters in Vietnam were rural-based (94%), not classified as poor (69%), with a slightly greater representation of ethnic minority groups (61%) than households of Kinh ethnicity (39%). The rural-poor accounted for roughly one third of commercial hunters (59/194).

It is fair to say that commercial hunters represent a diverse section of the Vietnamese demographic including vulnerable groups (e.g. rural-poor ethnic minorities) in addition to groups with relatively stable livelihoods (e.g. wealthy, urban, Kinh people). Any interventions targeting these actors in the trade chain should be aware of this diversity and ensure appropriate safeguards are in place to protect the vulnerable groups that will be affected.

We found that wildlife sales formed a small part of a household's diverse income base accounting for an average of 5.7% of total household income. Very few households were dependant on wildlife as a source of income, with only two of the 45,945 households (0.004%) stating that wildlife accounted for more than 50% of their overall income. These two households were both rural of Kinh ethnicity. We found that households not classified as poor were more dependant on wildlife income than those listed as poor, yet we also found that as the proportion of a household's income from wildlife sales increased, the wealth of that household decreases. These results are crucial for the design of our interventions and understanding the impact on livelihoods of rural communities as this dataset suggests that very few households are dependant on wildlife as a source of income. However, with 222/416 (53.4%) of the total hunting households reporting subsistence hunting, there are clearly livelihoods still dependant on wildlife for other uses other than income (e.g. meat, medicine etc). Therefore, to minimise impacts to livelihoods, interventions should be aimed at prohibiting sales of wildlife rather than stopping hunt-

ing itself and thus target commercial hunters and not those hunting for subsistence.

In terms of drivers of commercial hunting, although no relationships emerged with household assets and expenditures, we found household income to have a positive relationship with the amount of wildlife sold by households. In addition, we found that non-poor households and those of Kinh ethnicity sold a greater amount of wildlife than those classified as poor and of ethnic minorities. One common assumption is that reducing poverty will reduce wildlife trade, yet these results show that patterns of commercial hunting are not simple, direct relationships as often assumed by policy and in the design of interventions to raise household income.

Interventions aimed at providing alternative livelihoods work on the assumption that the availability of more profitable livelihood options will reduce participation in the wildlife trade (i.e. increasing the opportunity cost of commercial hunting). However, analysis shows that wildlife sales account for a small proportion of a commercial hunter's household income, and they continue to carry out other income generating activities alongside commercial hunting; thus provision of additional income sources may have little or no effect on the opportunity cost of commercial hunting.

It is likely that commercial hunters are driven by a combination of factors including those we are unable to measure with this dataset e.g. the desire for higher income, and the availability of transport and communications infrastructure. Probably the main financial disincentives to commercially hunt wildlife relate to the risk of detection, prosecution and fines by law enforcement agencies which at present are considered to be low. With expenditures for hunting equipment and supplies low and the potential profit high and growing as supply reduces, the financial incentives are likely to far out-weigh the current disincentives.

3. HOUSEHOLD LIVING STANDARDS OF WHOLESAL WILDLIFE TRADERS IN VIETNAM

Scott. I. Robertson & Tran Chi Trung

Vietnamese wholesale wildlife traders import and re-export significant quantities of wildlife across the globe. Wildlife can move through a varying number of intermediate traders (also referred to as middlemen) at village, commune, district and provincial level until it reaches retailers, exporters or end consumers. Previous surveys have found a large number of wildlife traders operating in Vietnam, forming networks working both cooperatively and in competition to supply demand for wildlife at a local, national and international level (Robertson 2007).

The main role of wildlife traders is procuring wildlife from producers (hunters, wildlife farms, and international import) and selling them onto retailers (restaurants, TCM pharmacies, pet shops, farms, souvenir shops etc) or directly to consumers, thus can be thought of as a form of wholesale market. Additional roles of illegal wildlife traders include provision of transport or financial loans to hunters, processing wildlife, or relationships with local enforcement officers to avoid arrest. The activities of these wildlife traders are thought to be almost entirely illegal, with the exception of wildlife they purchase from legal auctions of confiscated wildlife by the FPD (although that may then be illegally transported and sold). A number of the reasons that people trade wildlife are relatively well established:

- Wildlife sales bring high revenue to traders
- There is a stable to increasing demand from domestic and international customers
- There is a lack of disincentives to participation in this illegal trade (including low enforcement capacity/effort and pro-consumption/use national policies of the government who are also a major consumer of wildlife products).

- There are facilitating structures in place to support this illegal operation such as a rapidly improving national and regional communication and transport infrastructure, and relationships to local law enforcement or government in the form of a family relationship or corruption.

Studies over the last 10 years have repeatedly highlighted these wholesale wildlife traders/middlemen as key points for intervention, yet they repeatedly fail to be targeted by policy, enforcement or communication campaigns. The empathy shown towards these traders from law enforcement officers, government staff and NGOs often focuses on the income loss they are suffering, and there have been concerns about the level of dependency these households have on wildlife sales

It is likely that a majority of a trader household's income is from wildlife sales, and therefore many conclude that they are dependant on wildlife as a source of income. However, it is important to consider their overall livelihood status and vulnerability to determine if they would have the ability to raise income by alternative means, if wildlife trade was not available. In order to address the issue of livelihood

vulnerability as it relates to these actors, it is important to have reliable data on their household social and economic status. This will then help build political will to target wildlife traders and change policy to increase fines and punishments for them as there is no livelihood conflict.

This study investigated the hypothesis that wildlife traders form part of the rural poor, are from ethnic minority groups, isolated from markets, face low food security, and have few livelihood alternatives, poor education and health status. If this hypothesis is correct then there is justification for this group of actors in the wildlife trade chain to guide our interventions such that we do not increase their livelihood vulnerability.

Identifying wholesale wildlife trader households willing to discuss their operation and livelihoods with researchers poses a methodological problem. Almost all wildlife trading activities of these households is likely to be illegal and therefore many would be unlikely to discuss this openly. For this reason, we combined two approaches combining skills from different disciplines, namely law enforcement and social science, to overcome this.

From 2004 to 2007 forest rangers in four provinces in Vietnam (Quang Nam and Quang Binh, Lam Dong and Dong Nai) were trained in wildlife trade investigation techniques. Training included wildlife crime law, species and product identification, and investigation techniques. Following the training, rangers were coordinated to carry out provincial-wide surveys to identify all wholesale wildlife traders and retail outlets in the province (Robertson *et al.*, 2004, Robertson *et al.*, 2005, Robertson *et al.*, in prep).

These surveys identified 50 wholesale wildlife traders in both Quang Nam and Quang Binh provinces, 30 in Lam Dong province and 20 in Dong Nai province, totalling 150 in all four provinces. Information was recorded on wildlife trader names, addresses (to commune level only), trade scale (i.e. local, provincial, national, international), and where possible and considered reliable, quantity of trade. Although other wildlife trade surveys carried out in Vietnam have also collected names of wholesale wildlife traders; yet these surveys provided the most comprehensive lists of wholesale wildlife traders following similar methods. These 150 wildlife traders provided the primary sample for the next phase of research in this study.

Two teams of Vietnamese social scientists were deployed and collect livelihood data from 136 wholesale wildlife trader households. The team was unable to collect data from all 150 households as some refused to be interviewed, some had stopped wildlife trading activities so were omitted from the sample and others could not be located. The teams approached the survey as if they were conducting a household livelihood survey and did not reveal that they are focussing on illegal wildlife traders. Additional wholesale wildlife traders were included in the sample, as long as accompanying data on trade scale (i.e. provincial, national, international), trade products and if possible trade quantities were also collected.

Due to the time difference between when the wildlife traders were identified, social science teams confirmed that the household was still trading wildlife at the scale reported before through informal conversation during the interviews. The following data were collected from all households on their livelihood status: Wealth (Total value of fixed/durable assets; Total monthly non-food expenditures; classification as a poor house and/or participation in CT135 programs), Market access (rural/urban; distance to nearest town; distance to forest), food security (Monthly quantity of domestic meat (pork, beef, buffalo, chicken, duck and other poultry) and fish and shrimp consumed); Education (Years in education, Education level attained by household head, Highest diploma achieved in the household), Health (BMI); Household demographics (Ethnicity, No. household members)

The social & economic characteristics of wholesale wildlife trader households

We collected data from 136 wholesale wildlife trader households selling wildlife within their district (3 households) or province (25 households) and also to other provinces (55 households) and internationally to other countries (3 households). Forty-six traders reported some of the species they sold, although this list is likely to be incomplete but it included species of mammal (civet, mouse deer, wild pig, bamboo rat, sambar, pangolin, muntjac, macaque, bear, tiger, porcupine, serow, leopard, small wild cats, gaur, ivory, and rhino horn); birds (Red jungle fowl) and reptiles (snake, monitor lizards, hard-shell turtles, soft-shell turtles, cobra,

and python).

A total of 131 households were of Kinh ethnicity (96%) with only five from a minority ethnic group. Slightly over half of the households were based in rural areas (78/136, 57.4%) with the remaining found in urban towns (58/136, 42.6%).

In terms of our wealth measures we found wholesale wildlife trader household's total monthly non-food expenditures ranged from 24,000 VND – 39,120,000 VND (\$14.55–2,370.91) with a mean of 1,670,150 VND (\pm SE 302,818 VND) (\$101). The total value of fixed and durable assets ranged from 151,000 VND – 7,226,950,000 VND (\$9.15 – \$437,997) with a mean of 572,490,880 VND (\pm SE 71,267,758 VND) (\$34,696). Only eight households (5.8%) were classified as in poverty, yet it was speculated based upon their expenditures and assets that a number of these may have falsified reports to government to receive the benefits of a government poverty classification (e.g. loans, health insurance).

Only five of the 136 households reported facing a rice shortage during the last year ranging from 3–6 months. The total monthly quantity of domestic meat, fish, shrimp and seafood consumed by the wholesale wildlife trader households ranged from 1–108kg with a mean of 16.1kg (\pm SE 1.2). The total monthly quantity of rice consumed by the households ranged from 10–210 kg with a mean of 55.9kg (\pm SE 2.7).

Market access is a complex measure for wholesale wildlife traders as their market could be another nearby wholesale wildlife trader and not necessarily the nearest town. Nonetheless we still collected on distance to the nearest town and also distance to the nearest forest due to lack of a better alternative. Households were split roughly 50/50 in being closer to forest (67 households) or a town (69 households). We found wholesale wildlife trader households in towns and forest areas (i.e. 0km) and up to 50km journey from forest (Mean 10.3 km, \pm SE 1.2 km) and a reported 100km journey from the nearest town (Mean 5.5 km, \pm SE 0.67 km).

The education level attained by the household head of wholesale wildlife trader's households varied greatly, ranging from those with no formal education to attaining a Bachelor's Degree at University, with an average house-

holds head attaining a lower secondary school diploma. The highest education diploma attained in the household also varied ranging from Lower secondary school to attaining a Bachelor's Degree at University with the average household having at least one member attaining a Upper secondary school diploma.

How do the livelihoods of wholesale wildlife trader households differ in terms of the scale of their trade?

During the initial surveys we realised to get accurate and reliable data on quantity of species traded for a large sample of wholesale wildlife traders across the country is extremely challenging as this incriminating information is well-guarded and requires time to build trust and/or the use of extended periods of surveillance.

We used the proxy variable of scale of selling destinations to infer quantity/value of trade, under the assumption that traders selling at a wider scale are trading in greater quantities and/or higher values. We found wildlife traders more willing to discuss selling destinations than details on what and how much they sell. As there were only three households reporting to sell internationally and also at a district level we combined these into two groups: Traders selling within their province (28 households), and traders selling outside their province (58 households).

Our data did not indicate that wholesale wildlife traders who trade outside of their province wealthier than those trading within their home province. We found no significant difference in the monthly non-food expenditures and value of durable and fixed assets between households trading within their province or those trading outside their home province.

Although there was no difference found between the two trade scale groups of wildlife traders and the education level attained by the household head, we found a significant difference between the highest education level attained in the household ($X^2_1=5.5$, $P<0.05$) with more households trading outside their province achieving a Bachelor degree or Vocational College certificate. This result is ambiguous as although it may be an indication of education as a driver of wider trade, in many cases the head of the household was also the main wildlife trader and education was not signifi-

cant in their case.

We found no difference in the food security of these two groups in terms of the monthly quantity of domestic meat, shrimp, fish and seafood consumed, the monthly quantity of rice consumed, and the number of months the household faces a rice shortage.

In terms of market access we found no significant difference between the wildlife traders who trade outside of their province with those trading within their home province and the distance to the nearest forest. However, we did find a significant difference between the two groups and the distance to the nearest town with households trading outside their province significantly closer to towns (Mean 4.46km \pm Household living standards of wholesale wildlife traders in Vietnam \pm SE 3.26) (U28,58=457.5, P<0.005) (Figure 4).

How do wholesale wildlife trader households differ from commercial hunter households in Vietnam?

Understanding the relative vulnerability of the actors in the wildlife trade chain is important as we selecting the targets

of our interventions, or the impact of broad-scale interventions targeting the whole trade chain. Therefore, in this section we look at the differences between commercial hunter and wholesale wildlife trader households in a number of livelihood variables.

There are limitations in this analysis that should be acknowledged related to differences in sampling. The first issue is that the data on wildlife trader households were available from only four provinces whilst the commercial hunter households are from a nationwide sample. A second important caveat here is that the data for commercial hunters were collected in 2006, whilst for wildlife trader households were collected two years later in 2008. For most variables this is unlikely to be an issue but the wealth variables (expenditures and asset value) will be affected by a number of factors including inflation which according to the International Monetary Fund in 2006 was 7.5%, and 8.3% in 2007. Therefore, we adjusted the 2006 values by these inflation rates to increase the reliability of this measure.

We found that households of wholesale wildlife traders were significantly wealthier than households of commercial hunters in terms of their annual non-food expendi-

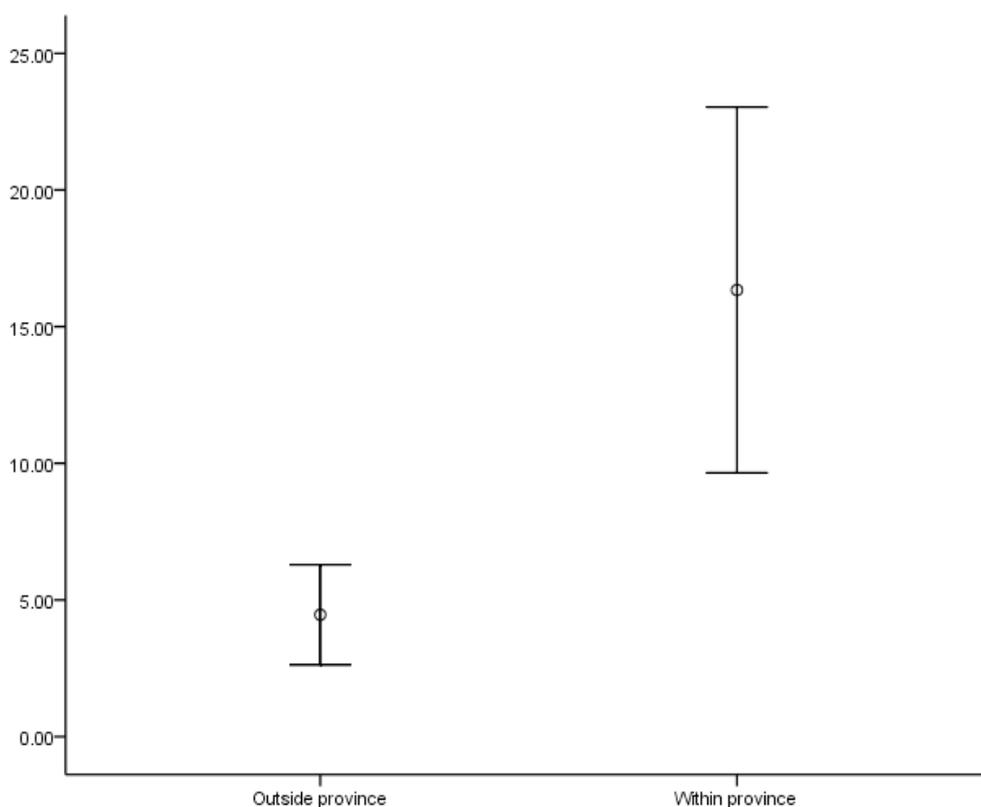


Figure 4: Graph showing the Mean (95% CI) distance to the nearest town (km) in wholesale wildlife trader households and the scale of their selling destinations

	Actor	Minimum	Maximum	Mean	Std. Error	Std. Deviation
Annual non-food expenditures	Trader	288.00	469,440.00	20,041.85	3,633.82	42,377.26
	Hunter	2,272.96	23,584.96	7,400.93	556.52	3,935.20
Fixed and durable assets	Trader	151.00	7,226,950.00	572,490.88	71,267.76	831,117.73
	Hunter	815.71	766,301.28	34,114.72	7,192.22	81,370.64

Table 6 (above): The difference in wealth of wholesale wildlife traders and commercial hunters from household surveys in 2006 and 2008 Units: 1000's of VND (16500VND=US\$1). NB: Hunter values were adjusted for inflation in 2006/07 by 7.5% and 8.3% respectively

	Commercial hunter	Wildlife trader	Total
Kinh ethnicity	76	131	207
Ethnic minority	118	5	123
Urban	11	58	69
Rural	183	78	261
Total	194	136	330

Table 7 (right): The number of Kinh and ethnic minority households commercial hunting and wholesale trading wildlife from household surveys in Vietnam

tures ($t_{184}=-4.3, P<0.0001$) and value of fixed and durable assets ($t_{262}=-16.7, P<0.0001$) (Table 6). We also found a significant difference between the number of households classified as in poverty between wholesale wildlife traders and commercial hunters ($X^2_1=31.6, P<0.0001$) with a greater number of commercial hunters classified as being poor by the government.

We also found a significant difference between the number of Ethnic minority households compared to those of Kinh ethnicity and if the household was a wholesale wildlife trader or commercial hunter ($X^2_1=1.1, P<0.0001$); with a greater number of ethnic minority households commercial hunting. We also found a significant difference between the number of households of commercial hunters and wildlife traders based in urban and rural areas ($X^2_1=66.1, P<0.0001$) with a greater number of urban-based wildlife traders than hunters, and conversely a greater number of rural-based hunters than traders. (Table 7)

In terms of the education level of the households, we found a significant difference between the number of households of commercial hunters and those of wholesale wildlife traders and (i) the education level of the household head ($X^2_{12}=4.4, P<0.0001$) (Figure 5) and (ii) the

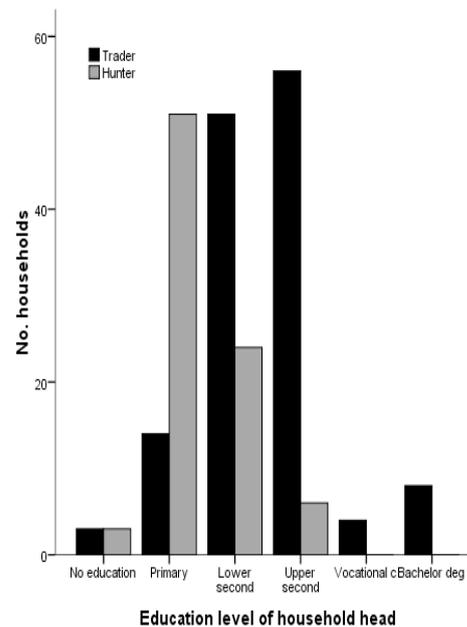


Figure 5: The education level attained by the household head of commercial hunting and wholesale wildlife trading households in Vietnam.

highest education level attained in the household ($X^2_5=2.2$, $P<0.0001$). Both of these results indicate that wholesale wildlife trader households have attained a higher education than commercial wildlife hunters.

Discussion

Our study is the first in Vietnam to collect detailed household data from known wholesale wildlife traders. We identified traders operating at a local, national and international level buying and selling a wide variety of species including those strictly protected and endangered e.g. rhino, tiger, bear, gaur, and hard-shell turtle sp.

We have characterised wholesale wildlife trader households as mainly wealthy households, with high food security, of Kinh ethnicity, relatively well educated and based in both rural and urban areas. We found no rural-poor households of ethnic minorities in the 136 wildlife traders visited. We did identify five rural Kinh households classified as poor, though this should be interpreted carefully as based upon their asset value and monthly expenditures this classification is likely to have been falsified.

This study set out to investigate whether wholesale wildlife traders in Vietnam were groups facing high livelihood vulnerability. This would include if they were rural poor, ethnic minority groups, isolated from markets, facing low food security, having few livelihood alternatives, and a poor education. Our analysis has clearly shown that this is not the case and although a reduction in the trade may reduce their household's income, it cannot be said that it would be adversely affecting a large number of vulnerable livelihoods in Vietnam, as these households are likely to have enough livelihood stability, available option and education to develop alternative income means.

We found no relationship between the scale of trade and household's wealth or food security, yet we found that households trading at a national/international scale were located closer to towns than those trading within the province. It may be that we have highlighted that trade scale is correlated to the improved transport infrastructure and transport hubs (e.g. bus stations, rail stations, airports and sea ports) available in towns, yet this may have no bearing on the quantity/value of the trade of these households. Understanding causal relationships of value/quantity of

the trade is challenging as access to this data is restricted by its illegal nature. However, our understanding to the high profit, growing demand and low opportunity cost of illegally trading wildlife is well-established. Resource investment should be directed designing interventions to target the illegal operations of these wholesale wildlife trader households who, with secure livelihoods will have the ability to raise income by alternative means, if wildlife trade was not available.

Conclusions

These two studies have provided one of the most detailed and extensive analyses of livelihood status of actors within the wildlife trade in Vietnam. Our study on wholesale wildlife traders also highlighted some of the challenges faced in accessing reliable and accurate information on illegal wildlife trade dynamics. The multi-disciplinary approach we took here involving conservation biologists, law enforcement agencies and social scientists has yielded promising results that should be further built upon in the future as we improve our understanding on wildlife trade dynamics.

Livelihood vulnerability and dependence

This study characterised wholesale wildlife traders as wealthy households of mainly Kinh ethnicity in both rural and urban areas. Overall only a very small proportion of these households showed signs of vulnerable livelihoods and given their wealth and education it is likely that they would be able to access alternative sources of income if access to wildlife was restricted. This result is not surprising with previous studies highlighting the greatest profit margin being found with wildlife traders who are considered to be an essential link in the wildlife trade chain, providing many invaluable services to both producers and retailers (Robertson 2007; Nguyen Van Song 2008).

We found commercial hunters to be mainly rural-based households of both ethnic minority and Kinh ethnicity, but of mainly non-poor households. Compared to wildlife traders they were less wealthy, had attained lower education levels and were more represented by rural ethnic minorities. In terms of dependence on wildlife income we found that an average of only 5.7% of commercial hunter's income came from wildlife sales and that the very few

households could be truly said to be dependant t any great level on wildlife income.

Our analysis of which households were more dependant on wildlife income were ambiguous as we found that non-poor and Kinh households showed greater reliance than poor and ethnic minority households; yet a relationship also emerged of decreasing wealth/domestic meat consumption with greater dependency on wildlife income. A study carried out in central Vietnam supports the finding of poor households showing lower reliance on forest products (inc. wildlife) than wealthier households and went on further to suggest that one reason for this may be the ability of wealthier households to pay the bribes to local enforcement agencies to allow access to the protected area (McElwee 2008). Overall it is fair to say that commercial hunters in this study showed a low dependence on wildlife income and as in other areas this appears to be associated with high livelihood diversity (Vedeld *et al.* 2004).

What drives the hunters and traders to trade wildlife?

We found that the value of wildlife sold increases with overall household income for commercial wildlife hunters, and furthermore that non-poor, Kinh households hunted greater amounts than poor, ethnic minority households. For wildlife traders we found that those trading on a larger scale (i.e. nationally and internationally) had attained higher education and were significantly closer to urban towns than those trading within the province.

These results indicate that people aren't driven to trade wildlife as a result of poverty or livelihood insecurity and that wealth may be a stronger driver for participation in the wildlife trade. These findings support the findings of similar studies investigating rural income dependence where forest-based income increased with the total household income (Vedeld *et al.* 2004).

Implications for interventions

The assumption that by reducing poverty, people will trade less wildlife is probably an over-simplification of the real situation. There is a consensus among wildlife trade experts, conservationists, and development practitioners that activities aimed at reducing poverty, and increasing income

and livelihood diversification have a low impact on reducing participation in the wildlife trade (TRAFFIC 2008). Indeed as highlighted in McElwee (2008), most ICDP projects target the poorest households for interventions, yet as was shown here and in other studies; these are not necessarily the households hunting the most wildlife or most dependant on wildlife as an income source.

Targeting urban-based wholesale wildlife traders could yield efficient results in wildlife trade reduction, and they have been highlighted by a range of studies as the key points of intervention (Song 2008, Robertson 2007, SFNC 2003). They are crucial actors in the trade providing important services to a number of producers and retailers, and their restriction would have impacts throughout the trade chain. Focussing on these traders would minimise threats to vulnerable livelihoods of subsistence hunters who would not be negatively affected by their removal from the wildlife trade.

An important objective in intervention design is to reduce any negative impacts on vulnerable livelihoods. Broad anti-hunting initiatives may actually pose greater threats to vulnerable livelihoods than approaches targeting sales of wildlife as they will also impact subsistence hunting households who may remain dependant on wildlife for as a non-income livelihood asset.

These studies provide quantitative data to support and guide the development of interventions aiming to eliminate the illegal trade in wildlife whilst not harming the to the livelihood security of rural populations. However, there is a critical need for a broad-level Government commitment to addressing the illegal wildlife trade as a means to secure wildlife populations in Vietnam, or these interventions will simply remain on paper. The fate of Vietnam's remaining biodiversity hangs in the balance and is fatally linked to the future of wildlife populations in neighbouring countries. These studies can hopefully act as a catalyst to improve the foundations of change required within current interventions.

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