RISTEK

End of Year Research Report

(Draft)

Selamatkan Yaki

Conservation Programme

2011

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Mr Sonny Tasidjawa, WCS – Sulawesi programme

a. Introduction

a.i. Background Information

The tropical forests of the Indonesian archipelago rank second among the top 25 biodiversity hotspots of the world, after Brazil (Myers *et al.* 2000). With a growing population of over 200 million, the demands for food, timber, energy and other resources are in competition with the extant flora and fauna, threatening many species with extinction and destroying the forests at a faster rate than observed in any other country worldwide (Ross & Wall 1999). According to Wilson *et al.* (2006), the island of Sulawesi should be prioritised for conservation efforts due to its high species endemism, cost-effectiveness, and likely success of conservation initiatives. The threats endangering Sulawesi's biodiversity are ubiquitous with other fragile habitats and include hunting, forest degradation and wildlife trade activities (Whitten *et al.* 2001, Lee *et al.* 2005). Poor management of protected areas, lack of local community conservation awareness and law enforcement currently hinder efforts to mitigate these threats (Lee *et al.* 2005).

In North Sulawesi, bushmeat hunting for consumption and commercial trade is a primary concern; where unlike the majority of Indonesia, the predominantly Christian population is not constrained by religious prohibition of wildlife consumption (O'Brien & Kinnaird 2000, Milner-Gulland & Clayton 2002, Lee *et al.* 2005,). In Tangkoko nature reserve in Minahasa, bushmeat hunting and consumption, for example, has extirpated endemic species such as the anoa (*Bubalus depressicournis*), babirusa (*Babyrousa babyrussa*) and the flying foxes (Lee 2000; Clayton & Milner-Gulland 2000). Remaining species such as bear cuscus (*Ailurops ursinus*) are vulnerable, and it has also led to a huge reduction in the *Macaca nigra* (Sulawesi crested black macaque) population, which is one of seven macaque species endemic to Sulawesi.

The home range of *Macaca nigra* is exclusive to Minahasa province, the far northern tip of north Sulawesi, and since the 1980's its population has declined by 85%. Previous census information estimated there were 300 animals/km^2 in 1980, which declined to less than 26 animals/km^2 by 1998 (MacKinnon and MacKinnon 1980; Sugardjito *et al.* 1989). Today, it is thought that there are less than 3 animals/ km2, although no large scale census has been performed in the last 10yrs (Melfi *et al.* 2007 in press).

The conservation of the *M. nigra* should therefore be considered a main priority on the island of Sulawesi. If the species is to be preserved for years to come and the threat of extinction is to be eliminated in the

near future, a conservation programme to address and mitigate the current threats to this species must be implemented with immediate effect.

a.ii. Scientific Justification for Research

In 2008 the IUCN red data list changed the status of the *M. nigra* from 'endangered' to 'critically endangered' due to previous research that indicated that there had been an 85% population decline in the last 30yrs (MacKinnon and MacKinnon 1980; Sugardjito *et al*. 1989; Rosenbaum *et al.* 1998; Melfi *et al.* 2007, 2011). It is likely that *M. nigra* populations have continued to decline since the last published surveys, even within protected forest areas, and that the anthropogenic pressures within *M. nigra* habitat continues, and is threatening this species with imminent extinction.

Conservation of *M. nigra* can only be effective and move forward with an accurate evaluation of the current threats facing the population today. Previous research has identified that the main threats to the survival of *M.nigra* are hunting, trade and the degradation of prime forest habitat across Minahasa, the *M. nigra* home range (Lee & Kussoy 1999, Clayton & Milner-Gulland 2000, Lee 2000, Lee *et al*. 2005, Rocky *et al.* 2007). Surveys of communities close to *M. nigra* habitat therefore provide a useful insight into human activity and the threats to the species and its remaining habitat. Additionally, the monitoring of bushmeat being traded in local markets can be a useful measure of levels of hunting activity, local demand and consumption of wild animals, and can give an indication of the remaining populations of species through accessibility of supply (Lee *et al.* 2000, REFS). Understanding the levels of bushmeat consumption, wildlife trade and forest resource exploitation/disturbance activities still performed today, is therefore vital, so that conservation initiatives can start to identify effective conservation actions and target the right communities that are causing the greatest threat to the remaining population of *M. nigra*.

a.iii. Scientific Review of past literature

Macaca nigra are now listed as 'critically endangered' (Supriatna & Andayani 2008, IUCN 2008). Previous studies have identified that threats to their survival are principally habitat loss and hunting pressure, which continue unabated (Melfi, 2010 in press). Previous survey research of local communities on the periphery of the protected sites, Manembonembo and Gunung Ambang Nature Reserves in Minahasa, found that over 90% of the communities consumed wild meat (Lee, 2000). Numbers of hunters and bush meat dealers across north Sulawesi has increased dramatically in recent years (Clayton & Milner-Gulland 2000, Lee *et al*. 2005). In Tangkoko nature reserve, another protected site in Minahasa, hunting has extirpated endemic species such as the *Bubalus depressicournis*, *Babyrousa babyrussa* and

Acerodon celebensis (Lee 2000; Clayton & Milner-Gulland 2000). Previous studies have also found that bush meat consumption increases with increased income (Riley *et al.* 2002), that it is not related to family size (Lee 2000), and that the sale and consumption rates for some species such as *M. nigra* peak around festive holidays (Clayton & Milner-Gulland 2000, Lee *et al*. 2005).

Continued harvesting of forest products such as timber, firewood, vegetables, palm trees, root crops, fruits and fodder by local communities surrounding protected areas in north Sulawesi, has also resulted in significant losses of prime forest habitat (Lee & Kussoy 1999). For example, surveys of Warembungan village in the Woloan I sub-district and villages on Talise Island, off the northern tip of north Sulawesi, were found to be strongly dependant on forest resources for income generation and household consumption (Rocky *et al*. 2007, Lee & Kussoy 1999).

Previously, assumptions were made that essentially the degree of reliance on forest resources was the primary indicator of household welfare, and directly related to income. Increasingly however, research has recognized that there is much greater community heterogeneity in patterns of forest resource use (Agrawal & Gibson 1998, Coomes *et al.* 2004). In a study of Amazonian villages, resource draw was found to be concentrated among just a few households both rich and poor; was not always associated with economic reliance; and resource draw activities varied markedly across household demographics including; age, family size, income and past experiences in extractive activities (Coomes *et al*. 2004).

However, despite the rapid deterioration of protected areas in North Sulawesi and the current threats imposed on its wildlife populations, there is very limited research that has examined the impacts that local communities have on these areas. This includes knowing the degree of reliance on forest resources and the extent of wildlife consumption and trade. Additionally, the associated socio-economic and demographic factors that are the cause of consumption and resource extraction activities are unknown. If the conservation of protected areas in North Sulawesi is to be successful, all these factors need to be defined, so that appropriate conservation-development schemes can be implemented.

The most recent research performed in 2007 by Melfi *et al.* (in press), conducted a survey of local people from 19 villages across Minahasa as part of a wider census survey of the *M. nigra* population. More recently, further surveys have been conducted in the village of Batu Putih, the entrance to Tangkoko reserve, to identify the main threats to *M. nigra* and their habitat (Sampson 2009, in press). In 2010 surveys in the village of Batu Putih identified the effectiveness of various educational materials in improving attitudes and empathy towards *M. nigra* and conservation (Van Wessem 2010, in press). This research has all been performed as part of the Selamatkan Yaki programme. In 2011 therefore, these

research projects have been expanded upon, in order to gain an even greater insight into the threats imposed on the *M. nigra* and its habitat, so that conservation action can start to be implemented effectively.

a.iv. Hypotheses

It is expected that the data collected in 2011will highlight that the threats to the *M.nigra* are still high and this information will be used to publish an official Conservation Action Plan for *M.nigra* as well as to address local and provincial governments and stakeholders, and build international conservation awareness of the species, so that appropriate actions can be implemented moving forward.

Based on the research for 2011, the following hypotheses were assumed:-

i. Local villages on the periphery of prime forest areas will show high levels of hunting and bushmeat consumption activities, including *M. nigra* species.

ii. Local communities on the periphery of prime forest areas will show a high level of reliance on forest resources and are still contributing to forest degradation of *M. nigra* habitat.

iii. The trade in Bushmeat of wild animals species in local markets is still high, and confirms that hunting and trade is a major threat to endangered animals, especially *M. nigra* in this region.

b. Objectives and Scope

b.i. Objectives and Scope of Research 2011

The Selamatkan Yaki programme's primary objectives and scope for 2011 aimed to take a multi-disciplinary approach to the collection of information to address the current threats and population status of the *M. nigra*, which could be used to inform a conservation strategy, whose aim is to 'achieve a self-sustaining wild population of *M. nigra* in their native habitat by 2016'.

The specific objectives for 2011 were as follows:-

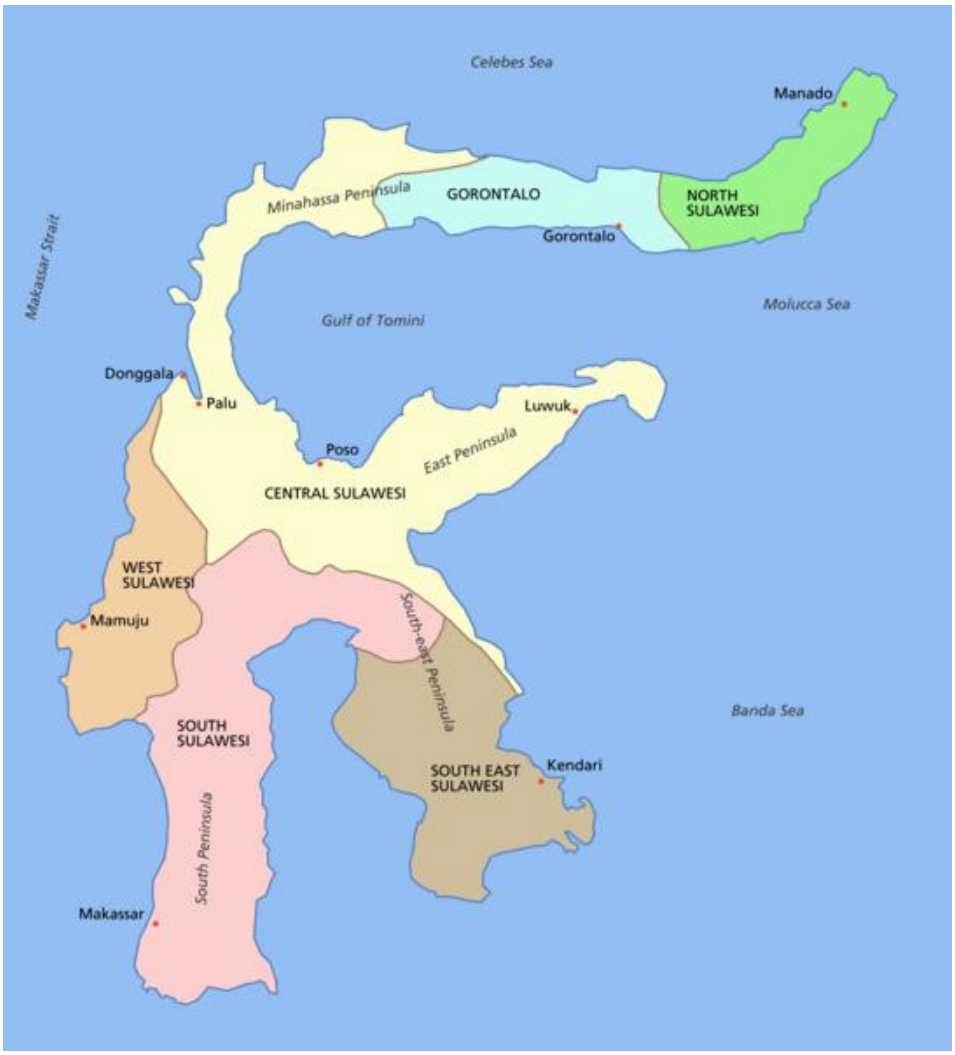
1. Formalise a working partnership between interested parties *in-situ* and *ex-situ*.
2. Build awareness of the SY programme and its research by disseminating information to local communities, stakeholders, government bodies, and universities in the form of presentations and the distribution of education materials.
3. Determine the anthropogenic threats posed to the current population of *M.nigra* within their native range and publish a Conservation Action Plan from this data.
4. Collect qualitative and quantitative data on bushmeat consumption and hunting, forest disturbance and resource extraction activities from local communities located on the peripheries of *M. nigra* habitat in Minahasa.
5. Determine the quantity and types of bushmeat being traded at 5 major markets across Minahasa, to assess the current threat to the *M.nigra* and other threatened species in North Sulawesi.
6. Identify future conservation/ research activities, methods to achieve them, and a fundraising and implementation plan.

b.ii. Research Description

The island of Sulawesi covers 174,600 km^2, has a population of 16million people (2005) and is divided into six provinces (figure 1). The majority of people in Indonesia are Muslim (86.9%), though there are areas of high Christianity; this is true of Northern Sulawesi, where it was estimated that approximately 85% of people in Minahasa are Christian, the study site (KSPSU 1994 cited by Lee, 2000). Sulawesi is the largest island included in the biogeographically unique region of Wallacea; totalling a land mass of 347,000 km^2. Separated from the rest of Indonesia by the Wallace's Line and from Australia-New Guinea by the Lydekkeer's Line, the flora and fauna of Wallacea have evolved to represent a high degree of endemism. As such this area has been designated as one of the 25 biodiversity hotspots, identified by

Conservation International (Myers *et al*., 2000), due to the importance and uniqueness of its flora and fauna.

Figure 1: An illustration of the six provinces within Sulawesi. This research was based in the Northern province of Sulawesi Utara (shaded green).



In addition to the high level of endemism seen in Sulawesi, a high degree of speciation has also been observed, including the existence of 7 species of macaque. The conservation status of the 7 Sulawesi macaques was last assessed by the IUCN in 2008 (Table 1) when, due to previous census research, the status of *M.nigra* was changed from 'endangered' to 'critically endangered'.

Table 1: A summary of conservation status and distribution of the 7 recognised endemic macaque species found in Sulawesi.

Species *Macaca*	Common name	Distribution in Sulawesi	IUCN red list category
nigra	Black crested	NE Minahasa	Critically Endangered
nigrescens	Gorontalo	N	Vulnerable
hecki	Heck's	NW	Vulnerable
tonkeana	Tonkean	Central	Vulnerable
maura	Moor	SW	Endangered
ochreata	Booted	SE	Vulnerable
brunnescens	Buton	Islands Buton & Muna (SE)	Vulnerable (C1)

M. nigra inhabit the Northern most tip of Sulawesi, a region called Minahasa. Its provincial capital is Manado, the population of which has doubled in recent years (pers. comm. J Tasirin).

Previous research performed between 2007 and 2010 (also supervised by V Melfi and J Tasirin) was disseminated to villages throughout Minahasa in 2011; where the data was previously collected. Additionally these villages were surveyed by the current researcher Helen Sampson, to expand on research undertaken in Batu Putih in 2009, exploring levels of bushmeat consumption, forest disturbance activities, and attitudes and empathy of local people towards *M.nigra.*

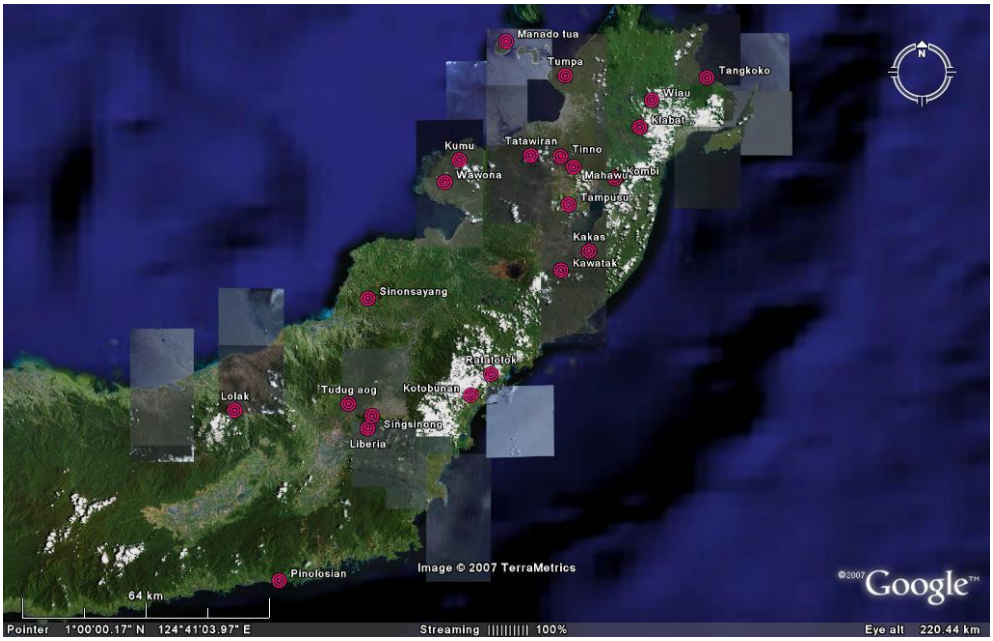
Research was also performed to evaluate the current trend in types and quantity of bushmeat being traded through the main markets in Minahasa. These types of data are especially important when considering mitigation strategies to reduce threats to the survival of this species, including designing appropriate education and awareness materials and also considering alternative sustainable livelihood initiatives to begin to be implemented in 2012.

b.iii. Methodology

Dissemination of information and village surveys

Study sites were the same as those visited in 2007 (Melfi *et al.* 2007; in press) which are evenly distributed throughout Minahasa, the *M.nigra*'s habitat range (Figure 2). Mountains covered in tropical high and lowland rainforest are the predominant feature in Minahasa where *M.nigra* mainly inhabit, and therefore the communities on the peripheries of these areas are the location for many of the study sites.

Figure 2: An illustration of the village survey sites distributed across Minahasa.



The villages visited are listed in Table 2. Three field assistants and the primary investigator, Helen Sampson conducted 40 household surveys per village in the local language Bahasa Manado, interviewing one adult member (>18yrs) from each household. A semi-structured questionnaire was used, containing a series of open and closed questions relating to a series of demographic questions, followed by questions regarding resource use (forest disturbance) and wildlife consumption, the same as that used in the research performed in Batu Putih in 2009 (Sampson 2009, in press) (See appendix 1). Results from the research conducted in 2007 were then disseminated to the local communities in the form of a presentation. Each village also received one of 3 types of education materials in the form of posters, books or an education presentation that had previously been evaluated for their efficacy in 2010 (Van Wessem 2010, in press).

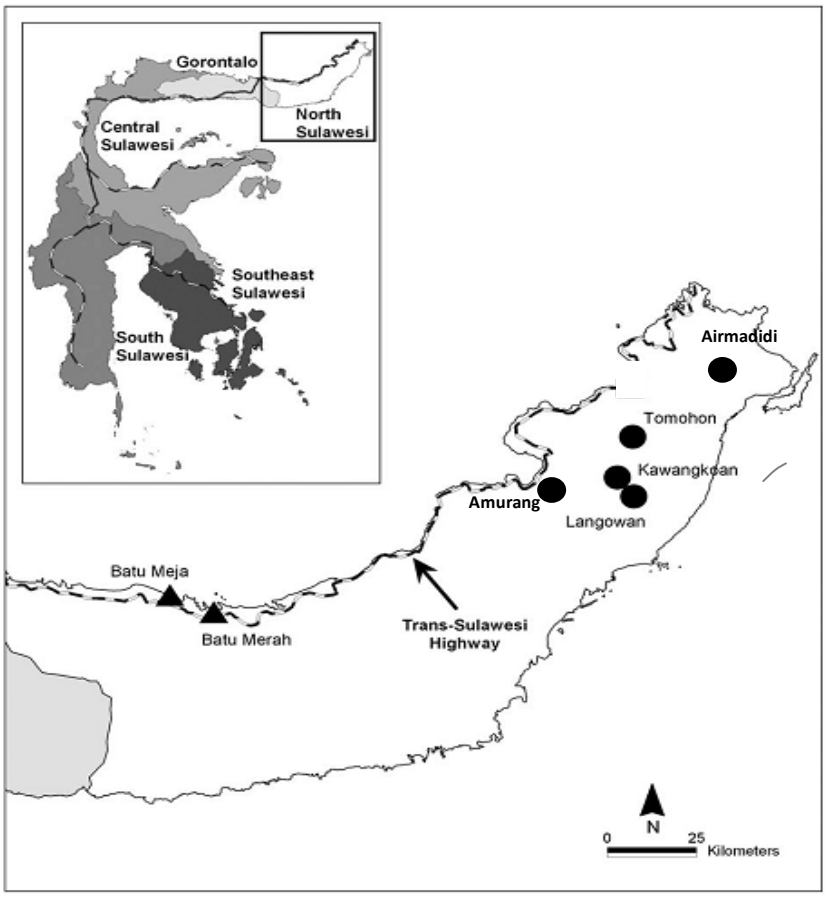
Table 2. The list of villages and their corresponding forest areas that were visited and surveyed

Village	Forest/Mountain Area	Village	Forest/Mountain Area
Agotey	Monembonembo	**Molas**	Mt Tumpa
Kumu	Monembonembo	**Kawatak**	Mt. Kawatak
Wawona	Monembonembo	**Airmadidi**	Mt. Klabat
Paslaten	Monembonembo	**Pinilih**	Mt. Klabat
Tinoor I	Mt. Empung & Tatawiran	**Kasawari**	Duasudara Batuangus
Rurukan	Mt. Mahawu	**Duasudara**	Tangkoko Duasudara
Pangolombian	Mt. Tampusu		

Bushmeat Market Investigation Research

The markets evaluated in the bushmeat trade investigations were chosen due to their size and local reputation for selling bushmeat and hadbeen identified in previous research (Clayton & Milner-Gulland 2000, Lee *et al.* 2005). Figure 3 illustrates the markets surveyed.

Figure 3. A table of the 5 markets surveyed and map to show their locations across Minahasa



Main Markets Surveyed
Airmadidi
Tomohon
Kawangkoan
Langowan
Amurang

*Map taken from Lee *et al.* 2005.

The 5 markets were surveyed over a 3 month period from October to December 2011. Five researchers were fully trained in conducting animal counts and species identification prior to research. One researcher per market undertook the research patrols every Saturday morning between 6am and 8:30am over the 3 month period. The researchers observed and monitored the numbers and types of species being sold using a clicker counter, recording the total number of whole animals of each species over the specified time period, whether dead or alive, the cost of different species/kg and, if possible, the origin of the bushmeat being sold. Appendix 2 shows the record sheet used by researchers during monitoring.

This method was similar to the research performed by Wildlife Conservation Society (WCS) who performed a market investigations project between 2001 and 2006.

c. Results and Discussion

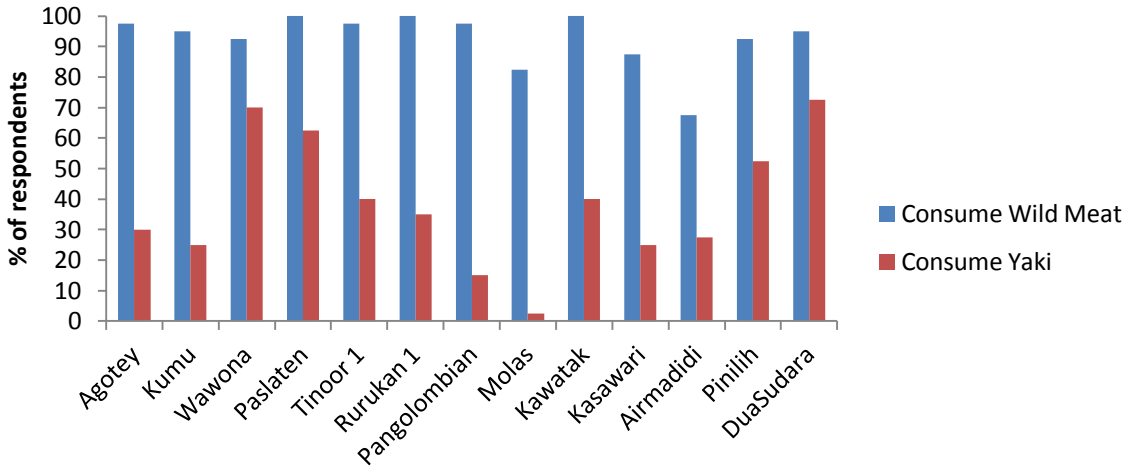
c.i. Research Results

**** Please note these results are just a small sample and general overview of the key points found. A more detailed statistical analysis of the data is yet to be performed and some of the research is still being collected up until 31st December 2011.**

Village Surveys

Over 65% of respondents across all the villages surveyed consume wild meat including; rats, bats, birds, wild pig, monitor lizard, cuscus and macaque (Figure 4). Over 50% of respondents in four villages reported consuming macaque, and most other villagers also reported varied yet high levels of macaque consumption (Figure 4). Consumption of macaque in Pangolombian and Molas village were comparatively low, and these communities also reported that macaque had not been seen in the forest areas near to the villages for some time.

Figure 4. The number of respondents who reported that they consume wild meat and *M. nigra*.



Many of the respondents went into the forest frequently (Figure 5). The variation in frequency of visits to the forest seemed to correspond with its distance or accessibility to the villages. Respondents reported performing a variety of activities in the forest that can be seen in Figure 6. The main reason for going into the forest was firewood collection. Hunting is also prevalent and specifically over 20% of respondents in 7 of the villages hunt regularly. Villagers reported hunting mainly rats and wild pig, and a small minority

reported hunting macaque. Of those that hunt, many reported laying traps for catching rats, and hunting with dogs and guns to catch wild pig and macaque.

Figure 5. The frequency respondents reported that they visit the forest

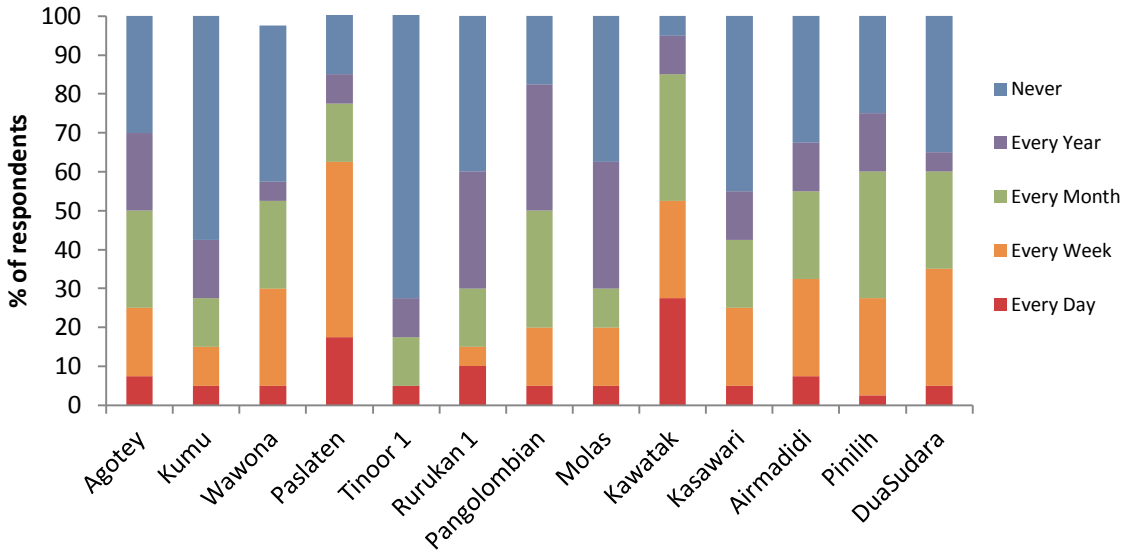
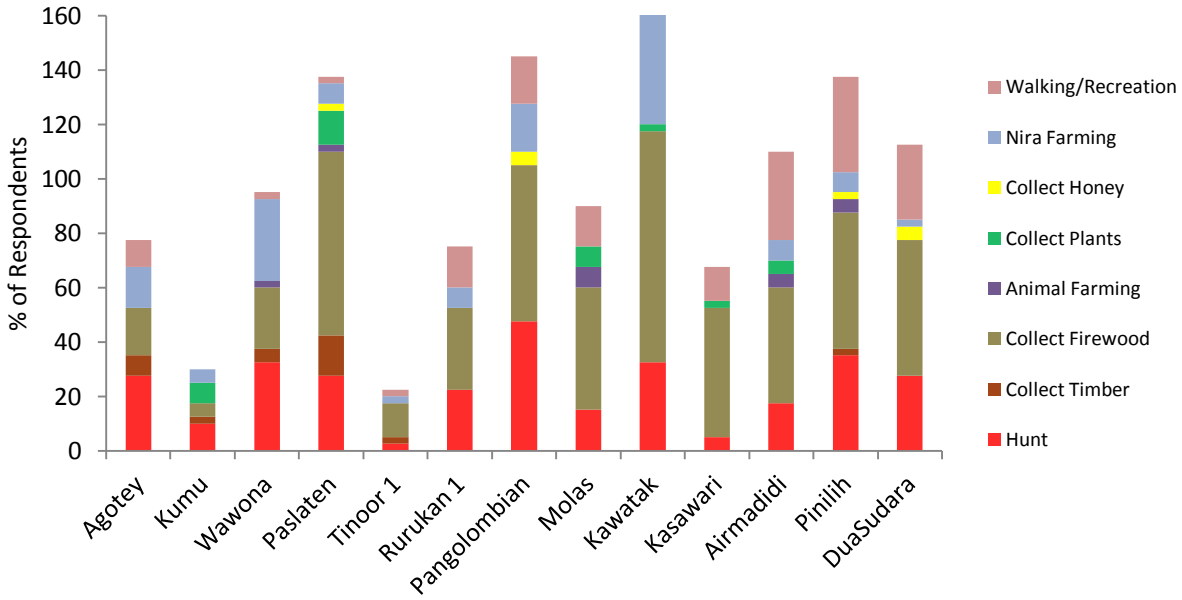


Figure 6. The types of activities respondents reported they performed in the forest



Market Investigation Results

Figures 7 & 8 represent data collected between 8th October and 12th November, as part of an ongoing study which should be completed by 31st December 2011.

Figure 7. Total quantity and taxa found in markets within Minahasa

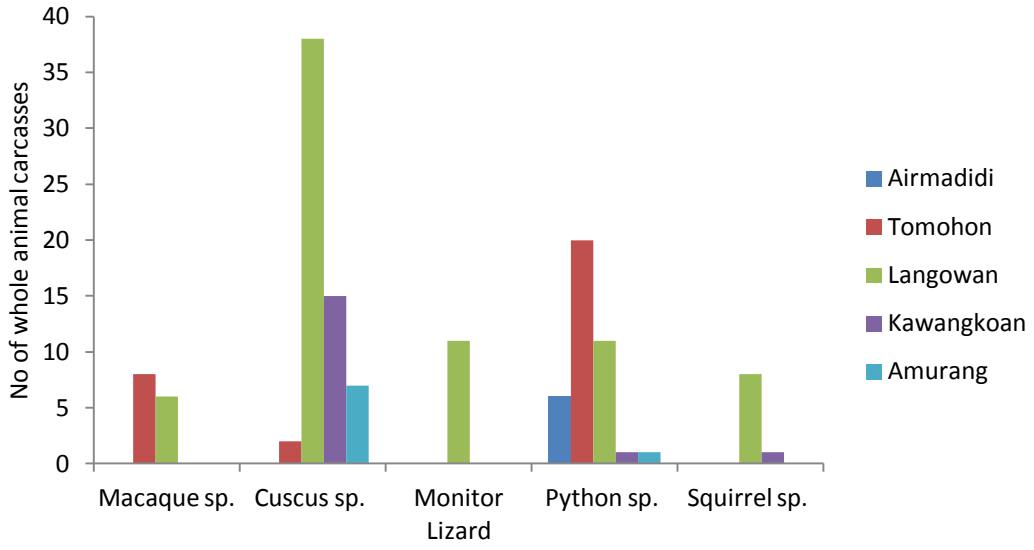
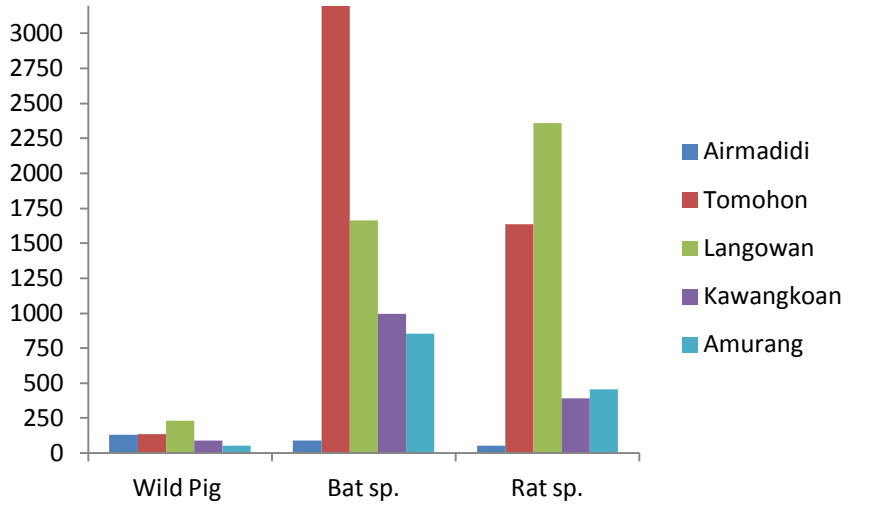


Figure 8. Total quantity and types of species found in each market



The data thus far indicate that a large quantity of bushmeat is currently being traded across all markets in Minahasa. Tomohon and Langowan markets trade in the largest quantities across the majority taxa monitored. These two markets are also the only markets that have been found to trade macaque species.

Airmadidi market was found to have the lowest quantities of all taxa traded, other than python where comparatively a larger quantity was sold. Information collected relating to cost of the traded bush meat is outlined in Table 3.

Table 3. The costs of each taxa traded at the markets

Species	**Min cost IDR**	**Max cost IDR**	**Measure**
Macaque sp.	20,000	25,000	/kg
Cuscus sp.	15,000	40,000	/kg
Python sp.	10,000	40,000	/kg
Bat sp.	7500	40,000	/tail
Rat sp	7500	25,000	/tail
Wild Pig	15,000	30,000	/kg

It can be seen that the cost of endangered species such as macaque and cuscus is not significantly higher than the more common species sold. Indeed, macaque is often sold at a lower price than cuscus, python and bat.

Once all data are collected a more thorough analysis and evaluation can be performed, including comparisons in the types and quantities of taxa sold each month, to look for changing trends leading up to Christmas festivities.

c.ii. Discussion of Results

The results shown here are just a very brief overview of the overall data analysis that needs to be performed. Some data is currently still being collected.

From the sample of data provided, it can be seen that local villages surrounding prime forest habitats are posing a significant threat to both the remaining population of *M. nigra* and their remaining forest habitat. Consumption of wild animals, including *M. nigra* is clearly unsustainable and is the greatest primary threat to the survival of many species, and in particular, the *M. nigra* in North Sulawesi. Additionally, the reliance of local communities on natural forest resources remains high, especially for timber and firewood, and is contributing to forest degradation of prime habitat, including those areas designated as 'protected'. There seems to be some variation in levels of hunting found across a number of villages, compared with the research performed in 2007. Those villages with reduced hunting patterns, profess that it is because *M. nigra* are no longer found in the area of forest near to their community. This is a concerning prospect, suggesting that the population of the species has since been extirpated from these

areas. Forest disturbance and bushmeat consumption levels across these villages suggest that immediate initiatives must be implemented to try and reduce these current activities, if the *M. nigra* are to continue to thrive in North Sulawesi.

Additionally, the trade in bushmeat clearly shows that both the levels of demand and supply of wild animal meat is high and should also be considered unsustainable. Many species that are being traded are indeed endangered species, including the *M. nigra*. This highlights the lack of law enforcement currently suppressing this trade and protecting the hunting of vulnerable and endangered species in Minahasa. It can be seen that, from the data thus far, Tomohon and Langowan markets need to be targeted for the sale of Macaque species specifically.

Therefore, in brief overview of the data collected and analysed thus far, it is clear that resource use, hunting and wild animal consumption is still highly prevalent across Minahasa, North Sulawesi and that these animals are being hunted, and the forests degraded, unsustainably. Action needs to be taken to try and reduce these threats through an integrated conservation programme which targets these issues effectively.

However, a more detailed evaluation and discussion of the results will be given in the final report in January 2012.

c.iii. Indonesian Development Programme

Until all the data has been collected and thoroughly analysed, we can not provide a detailed summary of what conservation development programmes should be implemented moving forward into 2012.

The principal investigators will use the final data collected in 2011 to evaluate the current threats facing *M.nigra* and consider what measures and conservation strategies might be effective in reducing these threats long term.

It is expected that the data collected in 2011will highlight that the threats to the *M.nigra* are still high and this information will be used to publish an official Conservation Action Plan for *M.nigra* as well as to address local and provincial governments and stakeholders, and build international conservation awareness of the species, so that appropriate actions can be implemented moving forward. However in brief summary, it is assumed that the following projects will be considered and prioritised, dependent on what the final research data reveals;-

1) An education programme to specifically target schools in Minahasa.
2) Build national and international awareness, targeting local communities, governments and other stakeholders and NGO's both locally and internationally.
3) Improved ecotourism programme in some areas on the periphery of protected areas
4) Improved agriculture techniques and sustainability
5) Alternative livelihood strategies
6) Alternative resource provisions
7) Work with the government in improving law enforcement of hunting and trade in endangered species across Minahasa

A more concise outline of potential development programmes will be provided in the final report in January 2012.

d. Conclusion

Data is still being collected as part of ongoing research and thus no conclusions are currently available.

However, the following has been accomplished by Selamatkan Yaki in 2011:

a) Built and formalised working partnerships with new and existing stakeholders and government bodies *in-situ* and *ex-situ*.

b) Collected and evaluated information that is being used to develop and publish a Conservation Action Plan for *M.nigra*.

c) Built awareness of the SY programme and its research by disseminating information to local communities, stakeholders, government bodies, and universities in the form of presentations and the distribution of education materials.

d) Performed research to evaluate the current threats to *M.nigra* including levels of local resource extraction and bushmeat trade in wild animal species to address and evaluate future conservation initiatives and priorities.

e) Developed a plan to implement other research and build on future conservation initiatives for 2012, based on data collated this year.

Publications:

H.S. Sampson. Selamatkan Yaki! Save the macaque. What's Happening Magazine. Spring ed. 2011
H.S. Sampson & V.A Melfi (*in press*) Demographic predictors of habitat disturbance and bushmeat consumption in North Sulawesi, Indonesia.
H.S. Sampson & V.A Melfi (*in press*) Attitudes as a predictor of levels of bushmeat consumption and resource use exploitation. North Sulawesi, a case study.
C. Van Wessem & V.A. Melfi (*in press*) A comparison of the efficacy of different conservation education media on the transfer of knowledge and impact on attitude and empathy towards the conservation of *M.nigra*) in north Sulawesi, Indonesia.

Presentations:

VA Melfi (Jan 2011) BAPPEDA, Manado, SY introduction.
H Sampson (Feb 2011) BKSDA, Manado
H Sampson (Jul 2011) International Conference on Ecotourism and Biodiversity, Java, Indonesia
VA Melfi, H Sampson (August 2011) Zoo Information Talk, PZEP
H Sampson (May and Nov 2011) UNSRAT, Manado
H Sampson (May to Nov 2011) numerous talks at Schools around Minahasa

e. References

Agrawal, A. and Gibson, C.C (1999) Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World.Dev.* **27** (4), 629-649

Clayton, L.M., Milner-Gulland, E.J. (2000) The trade in wildlife in North Sulawesi. In *Hunting for sustainability in tropical forests*: 473–495. Robinson, J.G. and Bennett, E.L. (Eds.). New York: Columbia University Press

Coomes, O.T., Barham, B.L. and Takasaki, Y. (2004) Targeting conservation–development initiatives in tropical forests: insights from analyses of rain forest use and economic reliance among Amazonian peasants. *Ecol.Econ.* **51**, 47-64

Lee, R.J. (2000). Impact of subsistence hunting in North Sulawesi, Indonesia, and conservation options. In *Hunting for sustainability in tropical forests*. 455–472. Robinson, J.G. and Bennett, E.L. (Eds.). New York: Columbia University Press.

Lee, R.J., Gorog, A.J., Dwiyahreni, A., Siwu, S., Riley, J., Alexander, H., Paoli, G.D., Ramono, W. (2005) Wildlife Trade and implications for law enforcement in Indonesia: a case study from North Sulawesi. *Biol.Conserv.* **123**, 477-488

Lee, R.J., Kussoy, P. (1999). Assessment of Wildlife Populations, Forest and Forest Resource Use on Talise Island, North Sulawesi, Indonesia. Proyek Pesisir Publication TE-99/09-E, Coastal Resources Center, University of Rhode Island, USA. 39 pages.

MacKinnon J and MacKinnon K 1980 Caga Alam gn. Tangkoko-DuaSudara, Sulawesi Utara Management Plan 1981-1986. Bogor, Indonesia.

Myers, N.R.A, Mittermeier, C.G., Mittermeier, G.A.B., da Fonseca and Kent, J. (2000) Biodiversity hotspots for conservation priorities. *Nature* **403**, 853-858

O'Brien, T. and Kinnaird, M. F (2000) Differential vulnerability of large birds and mammals to hunting in North Sulawesi, Indonesia, and the outlook for the future. In *Hunting for sustainability in Tropical forest*. 199-213. Robinson, J.G. and Bennett, E.L. (Eds.) New York: Columbia University Press.

Riley, J., Siwu, S., Antono, B., Keintjem, J., Manurung, M. and Pontonowu, S. (2002) Monitoring and control of the trade in protected wildlife in North Sulawesi, Indonesia. A report to Forestry Department (PKA). The Wildlife Conservation Society.

Ross, R., Wall, G. (1999) Evaluating ecotourism: The case of North Sulawesi, Indonesia. *Tourism Manag.* **20**, 673-682

Rosenbaum B, O'Brien T, Kinnaird M and Supriatna J 1998 Population densities of Sulawesi crested black (*Macaca nigra*) on Bacan and Sulawesi, Indonesia: Effects of habitat disturbance and hunting. American Journal of Primatology 44: 89-106

Sugardjito J, Southwick CH, Supriatna J, Kohlhass A, Baker S, Erwin J, Froehlich J and Lerche N 1989 Population survey of macaques in Northern Sulawesi. American Journal of Primatology 18: 285-301

Supriatna, J , Andayani, N (2008) *Macaca nigra*. In. *2008 IUCN Red list of Threatened Species*. www.iucnredlist.org. 07 February 2010.

Whitten, A.J., Mustafa, M. and Henderson, G. (2001) *The Ecology of Sulawesi*. Oxford: Oxford University Press.

f. Appendices

fi. Appendix 1 – An example part of the survey used during village survey research.

Date:
Comments:

1) Demographics:

1.1 Age

1.2 Sex:

1.3 Number of family members living in the house:

1.4 How long have you lived in the village:

1.5 What is your profession?

1.6 How much of your day is taken up by your profession?

1.7 What is your monthly income?

1.8 What did your father and your grandfather (if male) [or mother and grandmother (if female)] do for a living?

2) Resource Use:

2.1 How often do you or your family go into Tangkoko forest?

2.2 What do you or your family do/collect in the forest?

2.3.1 Do you or your family sell anything that you collect from the forest?

2.3.2 If yes, what do you sell?

2.4 Do you or your family put traps in the forest?

2.5 If yes, What do you catch and how often?

2.6.1 Do you or your family sometimes eat wild meat

2.6.2 If yes, what do you eat?

2.7.1 Do other people in the village eat wild meat?

2.7.2 If yes, what do they eat

2.8.1 Do you or your family buy anything that comes from the forest?

2.8.2 If yes, what?

2.9.1 Have the number of animals in the forest changed in the last 10yrs?

2.9.2 If yes, increased or decreased?

2.9.3 Do you know why this has changed?

2.10 Do you think there is as much forest today as there was 10yrs ago?

2.11 Do you think that people in this village would not go into the forest if other resources were available to use?

2.13 If other ways to make more money, would you consider changing from your current profession?

2.14 Why are some people trying to protect the forest?

2.15 Do you think protecting the forest is good or bad for your village?

f.ii. Appendix 2 – An example of the check sheet used during market investigation monitoring

Selamatkan Yaki Market Monitoring Survey

DATA SHEET

Nama Pasar : **Hari/Tgl** :

Lokasi : **Pengamat** :

No	Jenis Satwa		Hidup	Mati	Total	Asal Satwa	Harga		Per	Keterangan
							Min	Max	Kg/Ekor	