

# The Endangered Sulawesi Tortoise (*Indotestudo forstenii*): behavior, habitat, population in the wild and the harvest level

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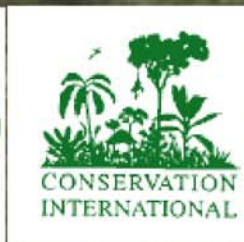
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2<sup>ND</sup> INTERIM REPORT

**The Endangered Sulawesi Tortoise (*Indotestudo forstenii*):  
behavior, habitat, population in the wild and the harvest level**

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# INTRODUCTION

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The fauna of Sulawesi (formerly Celebes) is among the most distinctive in Indonesia, with high levels of endemism among terrestrial mammals, amphibians, and invertebrates (Whitten et al. 1987; Gillespie et al. 2005). Previous authors (de Rooij 1915; Iverson 1993; McCord et al. 1995) mention three species of non-marine chelonians are known from Sulawesi, including the widespread Malayan box turtle, *Cuora amboinensis*, and two endemic species, the Sulawesi tortoise, *Indotestudo forsteni*, and Sulawesi forest turtle, *Leucocephalon yuwonoi*. Regarding turtle species richness of Sulawesi, we have clarified the presence of *Amyda cartilaginea* that previously still in question by Iskandar (2000) and recently added to the list of Sulawesi's chelonifauna by Koch et. al (in press). However, the turtles of Sulawesi have received scant scientific attention and little is known about their distribution and life history. Information on life history, current distribution and status is lacking (Ernst and Barbour 1989). Such information is essential for planning effective conservation and resource management strategies (Das 1997), especially in Sulawesi where remaining wildlife populations are threatened by commercial exploitation and habitat loss (Whitten et. al. 1987).

The Sulawesi tortoise (*Indotestudo forstenii*) is considered one of the world's rarest tortoise, occurs on Sulawesi and possibly the nearby island of Halmahera (Iverson 1992); least studied testudinids (Platt et.al. 2001) and the only tortoise known to occur east of Wallace's line (Hoogmoed and Crumly 1984). Groombridge (1982) reported a population near Morowali Reserve (nowadays it is Morowali National Park) in Central Sulawesi and then Platt et.al. (2001) added Cape Santigi. Earlier reports that populations of *I. forstenii* on Sulawesi originated from the introduction of *Indotestudo travancorica* by early seafarers (Hoogmoed and Crumly 1984) are now considered erroneous, and morphological and genetic data indicate the two species are quite distinct (Pritchard 2000).

Currently, *Indotestudo forstenii* is classified as endangered by IUCN threat categories and listed on Appendix II of CITES (Colijn 2001). However, this tortoise is not protected under Indonesian Law. The determination of the quota was based more on the quota realization the years before. Pritchard (2000) reported that large numbers of living tortoises have been exported from Sulawesi during the past 10 to 15 years. Prijono (2002) suggested that ideally an assessment to acquire information on the status of the species in the wild should be performed before the harvest of wild species begins. This assessment should aim to determine turtle abundance, distribution, role in the habitat and ecosystem, reproductive capacity, habitat quality, reproductive behavior, etc. Based on this information, harvest level can be set with a reasonable assurance that they will not have a detrimental impact on the survival the species in the wild.

It is important to do field work to obtaining abundance and structure of wild population, natural history, habitat ecology and distribution. This information is needed to better understand the Sulawesi tortoise and to assist current and future plans for *in-situ* and *ex-situ* conservation management programs. Herein we present the results of these surveys and provide conservation recommendations based on our findings.

# METHODS AND STUDY AREA

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Fieldwork was conducted from 5 November to 4 December 2007.

## 1. Trade Surveys

Legal trades were assessed based on turtle stock assessments of PHKA-registered traders/suppliers in Central Sulawesi. At least 10% of turtle stocks of each trader/supplier were assessed in size (strength median carapace length /CL, carapace width/CW, weigh and sex. Local utilization was assessed based on interviews to traditional market and traditional medicine Chinese shop. Illegal trade was assessed based on interviews to trappers, middleman, and supplier.

## 2. Population and Natural History Surveys

Population and natural history surveys were conducted in seven sampling sites in Central Sulawesi. Density and catch-per unit effort were applied to gathered population data. Surveys started at 08.00 am and finished at 05.00 pm. Searching were done in the quadrat plot that each wide depending the habitat which generally bevels. All *I. forstenii* captured were marked by notching the marginal scutes of the carapace, bleed for sample, and measured (CL, CW and weigh). Feces and parasites were also collected when possible. In some sites, we also conduct survey for *L. yuwonoi*.

## 3. Habitat Surveys

Habitat surveys were conducted in three sampling sites in Central Sulawesi. The following data were obtained i.e. vegetation type, topography, temperatures and humidity of air and land. Position on every site was taken with GPS. Qualitative description was applied to record the topography,

weather and vegetation (e.g. disturbed/undisturbed forest, canopy cover, tree falls, etc). The disturbed or undisturbed were described based on the different signs of logging activities such as old logging roads or tree stumps. Canopy cover was classified into three categories: full cover, semi cover and open. A location were noted as full cover if the canopy is dense enough to shade out the majority (>50%) of sunlight. Semi cover was noted if the canopy broken and sunlight penetrated to the forest floor and open was noted if no canopy existed at all. Environmental variables such as air and land temperatures and humidity were recorded using manual pH meter and Hygrometer.



Figure 1. Survey sites in Central of Sulawesi.

# TENTATIVELY RESULT

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## 1. Trade Surveys

In this second moment, we was visited a registered companies (Depot Losari) in Palu at 6 November 2007. In Depot Losari, we encountered only 10 individuals of *I. forstenii* and 25 individuals of *L. yuwonoi*. In Ganonggol/Karya Agung, we encountered a total of 38 juveniles *L. yuwonoi* (Fig.2) and the only one male adult *I. forstenii*.



Figure 2. A total of 38 juveniles *Leucocephalon yuwonoi* were ready to bring to Palu.

## 2. Population and Natural History Surveys

Population and natural history surveys were conduct on three sites in Central Sulawesi; Palu valley (3 localities), Sipayo (3 localities), and Ganonggol forest (Fig. 1).

### *a. Palu valley*

Three hills in Palu valley were surveyed, that are Bodi, Gunta and Poboya Natural reserve. In these localities, we searching the tortoise by four people with each locality were 3 days searching.



We captured a single tortoise with total area covered around 900,000 m<sup>2</sup> on Bodi hill (0°44'49.50"S; 119°54'2.30"E). The tortoise was captured in the second day when sheltering under *Opuntia nigricans* at 2.30 pm (Fig.3). In Gunta hill (0°45'20.20"S; 119°53'24.30"E), we also caught only single sub adult *I. forstenii* in the first day at 3 pm. The tortoise when we found still have attacked by a parasite (Fig.4). The parasite still ongoing identified. Total are survey in Gunta was around 1,500,000 m<sup>2</sup>. In Poboya Natural Reserve, we failed to found the tortoise although have been covered a total area around 900,000 m<sup>2</sup>.



Figure 3. *Indotestudo forstenii* sheltering under *Opuntia nigricans* in Bodi hill, Palu valley.



Figure 4. The tortoise attached by a endo-parasite in wild, specimen in Gunta hill, Palu valley.

***b. Sipayo site***

We were covered three localities in Sipayo site. The localities are Manili (0° 4'24.27"N; 120° 4'25.09"E), Malanggo/Dongkalan (0° 9'36.40"N; 120° 7'27.00"E) and Aluangas forest (0°15'24.50"N; 120° 7'14.50"E). . We spent two days in each locality Manili and Dongkalan hill. We failed caught tortoise in their habitat but one pig hunter shown to us a single adult *I. forstenii* that was caught a week before from Manili. In Dongkalan, we got a former keep a single adult female of *L. yuwonoi* (Fig.5) and a couple of juvenile *C. amboinensis* (Fig.6). In Aluangas forest we searching tortoise and freshwater turtle by six people as long as four days. At the day we searching the tortoise and at the night searching the turtle. We failed caught tortoise but success caught two *L. yuwonoi* although have been searched in a total of 387,000 m<sup>2</sup> (a.450m x 500m, b. 350m x 450m, c. 50m x 200m). A single adult male (Fig.7) was caught in the second night at 10 pm., and a single juvenile (Fig.8) was caught in the fist day at 4 pm. on drainage when rainy.



Figure 5. Adul female of *L. yuwonoi* (a), a couple of *C. amboinensis* (b) from Dongkalan, Sipayo.



Figure 6. A couple of *C. amboinensis* from Dongkalan, Sipayo.



Figure 7. A male adult of *L. yuwonoi* that found in Aluangas river, Aluangas, Sipayo, Central Sulawesi.



Figure 8. A single juvenile of *L. yuwonoi* that found in drainage around Aluangas river, Aluangas, Sipayo, Central Sulawesi.

### *c. Moutong forest*

In this site, we searching tortoise by six people and a hunting dog. Same strategy in Aluangas applied here, in the night we searching the freshwater turtle and the day we searching the tortoise. A total area covered was around 2,500,000 m<sup>2</sup> a long seven days. In this site we only success caught *L. yuwonoi* (Fig.9), a total of four juveniles was caught.



Figure 9. A single juvenile of *L. yuwonoi* that found in Ganonggol river, Central Sulawesi.

### 3. Habitat Surveys

Environmental data from were presented in table 1.

Table 1. Environment data of each sites surveyed in Central Sulawesi.

Sampling Plots	Elevation (m)	Canopy Cover	Slopes (°)	Land		Air	
				pH	%	Temperature (°C)	%
Bodi hill 1, Palu valley		Semi	60-70	6	20	29	89
Gunta hill 2, Palu valley		Open	60-70	6	45	31	59
Poboya natural Reservel, Palu valley		Open	60-70	6	40	32	60
Manili hill, Sipayo		Semi & Close	60-70	6	57	30	70
Dongkalan hill, Sipayo		Semi & Close	60-70	5.6	55	31	80
Aluangas forest, Sipayo		Close	0-60	4.3	56	29	77
Ganonggol forest		Close	30-60	6.1	30	34	53

The vegetation sample still ongoing identified. In Bodi hill, the vegetation except characterized by *Opuntia nigricans* also by the fire resistant lontar palm (*Borassus flabellifer*) (Fig.10). The important attention is habitat on Ganonggol being highly pressured by human activities such as clearing for farm (Fig.11), logging; meanwhile Aluargas forest have being pressure by logging (Fig.12).



Figure 10. Clearing for farm in Ganonggol.



Figure 11. Clearing for farm in Ganonggol.



Figure 12. Logging in the Aluungas forest, Sipayo, Central Sulawesi.

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# FINANCIAL REPORT

Items	Unit price (Rupiah)	Total price (Rupiah)
Bogor-Jakarta, 2 persons by Taxi	350,000	350,000
Jakarta-Palu, 2 persons by BATAVIA Airlines Sukarno Hata airport tax	1,250,000 30,000	2,620,000
Mutiara airport to Palu City	35,000	75,000
Local transportation along in Palu and around	250,000	250,000
Palu-Sipayo, by car rent already including driver and fuel	800,000	800,000
Sipayo to Ganonggol	450,000	450,000
Ganonggol to Palu	1,100,000	1,100,000
Palu-Jakarta by LION Mutiara airport tax Local government retribution	1,280,000 9,000 5,000	2,588,000
Jakarta-Bogor by taxi	350,000	350,000
Accommodation (food, housing, camp) using Government standard, 30 days for two people	260,000	15,600,000
Honoraria for extra man power (professional hunter)		
Adjmain (9 days)	75,000	675,000
Tahama (9 days)	75,000	675,000
Mandar (10 days)	75,000	700,000
Ra'soen (4 days)	50,000	200,000
Rizal (4 days)	50,000	200,000
Basko (4 days)	50,000	200,000
Lilik (9 days)	50,000	450,000
Arten (7 days)	75,000	525,000
Ngani (7 days)	50,000	525,000
Mansur (4 days)	50,000	200,000
Ramli (4 days)	50,000	200,000
Camping tent (2 pieces)	750,000	1,500,000
Fee for identification (vegetation and parasite sample)	400,000	400,000
Purchase Litium battery	600,000	600,000
		31,233,000