

DISTRIBUTION AND POPULATION OF
SULAWESI HAWK – EAGLE (*Spizaetus lanceolatus*)
IN SOUTH AND CENTRAL SULAWESI

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SUMMARY

The research aimed to gather information on distributions, populations, and status of Sulawesi Hawk-eagle *Spizaetus lanceolatus*.

The research was carried out at 36 sites in Sulawesi. Although the habitat of Sulawesi Hawk-eagle ranges 0-800m asl., the species concentrated between 600-800m, suggesting the decrease of lowland forest. Population is estimated as 254-306 pairs in South and Central Sulawesi.

The species was more frequently seen in lowland forest than other forest types. The species was less encountered in the open forest of less than 25% coverage. In the forest of more than 50% coverage, it was difficult to detect the bird due to dense leaves.

Plantations are recorded in the northern part of South Sulawesi and Tolitoli of Central Sulawesi. The forest degradation due to land conversion, hunting and logging, are detected in Central Sulawesi. The situation is getting worse because of the recent chaos.

Local people consider raptors as injurious, but mostly ignore. Poaching for trade, based on interviewing people and visiting bird market, was not detected.

The community awareness to conserve eagles, in particular Sulawesi Hawk-eagle, has been made through dissemination of posters in whole Sulawesi.

INTRODUCTION

Sulawesi Hawk-eagle has a near-threatened status, on appendix II CITES and protected by Indonesian law and endemic to Sulawesi (Shanaz *et al.*, 1995; WCMC, 1998). Conservation effort on Sulawesi Hawk-eagle are importantly needed before it really be extinct. Efforts to enhance the awareness of people to conserve this hawk-eagle applied as entry point to save the remaining forest as their habitat. Forest conservation is greatly of important to the life of not only biodiversity moreover to all local communities at Sulawesi. The information about Sulawesi Hawk-eagle is limited and poorly known. The research about Sulawesi Hawk-eagle is becoming very important especially the bird is one of endemic bird that very susceptible to be extinct because their high dependence to the forest.

The aim of the programme is to improve understanding of genus *Spizaetus* in Indonesia. The objectives of the project are to identify of status, distribution and population of Sulawesi Hawk-eagle, to describe habitat and its disturbances, and to increase the community awareness to conserve the Hawk-eagle.

The expected results of the programmes were knowledge and information of status, distribution and

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population of Sulawesi Hawk-eagle, knowledge of disturbances forcing the Sulawesi Hawk-eagle. Comparing information of the Indonesian endemic Hawk-eagle, establishing the Hawk-eagle networking with local NGO's and scientists, and recommendation of Sulawesi Hawk-eagle conservation action and follow up researches. Forest vegetations (trees with DBH \geq 4.5 cm) in 46, 0.16 ha plots of six forest types; dry dipterocarp.

METHOD

Method usually used to observe the tropical forest raptor is according to the opportunity on encounter species of bird. Survey on wide area which limited time for seeking a secretive bird is needing a necessary specially attention to a smaller area to convince the effective observation (Bibby *et al.*, 2000). On experience with observation on the Javan Hawk-eagle as similar genera to Sulawesi Hawk-eagle, we use observation method focused on the forested area. However, Sulawesi Hawk-eagle has already known distributed from sea level to 3,000m (Coates *et al.*, 1997), moreover we visit several areas which has variety of habitat type and elevation to get approaching specific habitat of this species.

Selection and survey locations

Field study was conducted in South and Central Sulawesi provinces. Survey in South Sulawesi was beginning on February to middle April 2000 at seven selected conservation areas. Survey in Central Sulawesi was visited five selected conservation area was made on March and August to September 2000.

Data Record

During field observation, *look-down method*, to observe on a hill taking the opportunity to monitor the top of canopy or from the suitable in the edge forests or open areas is the best way to detect raptor occurrence (Thiollay, 1996). Searching and determining on vantage point is made on the first day observation, followed by daylight observation on the next day. Observing on the higher elevation taking the advantage on the possibility of seeing wider point of view is priority given.

RESULT AND DISCUSSION

General Setting

South Sulawesi comprises of 24 districts and the most developing than other province at the Sulawesi Island. In addition, human population are increasing and most of the inhabitants are farmers both of rice and other industrial agriculture such as cocoas, coffees, and spices. The high value of cocoas on recent years was stimulating forest encroachment for extensive plantation.

Central Sulawesi Province has diversity land habitat type that spread out from coast to mountain in 2,500m asl. Mountain rainforest (upper and lower Montane) and lowland rainforest are in along Tokalekaju Mountains and Ogoamas Mountains. This forest type dominates most of area in Lore-Lindu National Park. Morowali Nature Reserve has most completely vegetation type, from mangrove forest until *hutan lumut* (moisy forest) at 2,200m asl.

Distributional of Sulawesi Hawk-eagle

The Sulawesi Hawk-eagle found on 36 observational sites of 55 observational points. In South Sulawesi,

29 observational points on 13 locations and 11 observational points were the Sulawesi Hawk-eagle found. In Central Sulawesi is more record of observational point, 26 observational points of seven locations and the Sulawesi Hawk-eagle found on 25 observational points. (see Table 1).

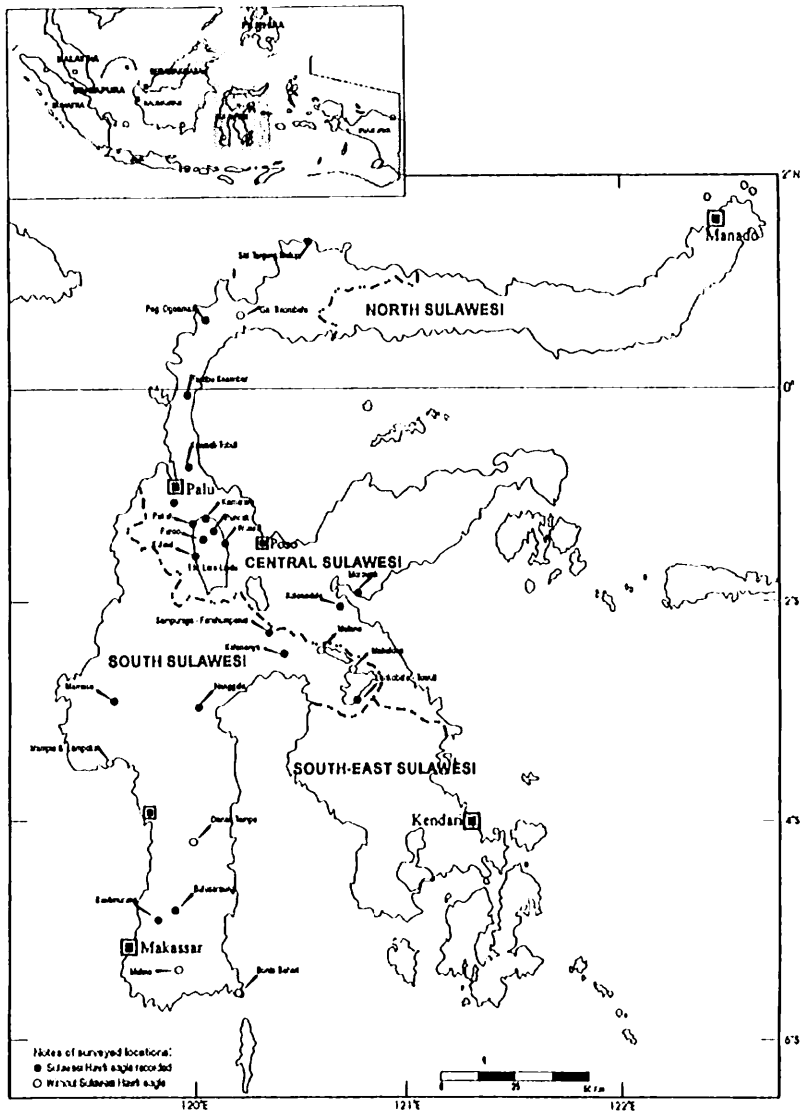


Figure 1. Map of survey location and locality record of Sulawesi Hawk-eagle.

In South Sulawesi province, the Sulawesi Hawk-eagle is less recorded on lowland area, especially deforested habitat of lowland forest to agricultural and fishpond in this area. To more northern area of this island, this species is more present recorded especially at Tana Toraja regency and Polewali-Mamasa, to northern Luwu and Mamuju until into boundary area of Central Sulawesi. In Central Sulawesi, this species widely and distributed on every forested area. Meyburg and van Balen (1994) indicated this species found not uncommon. Therefore, distribution of this species is not limit to main island of Sulawesi but was record

on satellite islands. A present record, widely distributed of this species but not commonly to be seen in Buton island (Baltzer, 1998) record on Banggai Island (Indrawan. *et al.* 1997), and sometime to be seen at forest in Togeang Island (Indrawan press. com) and not recorded in Sangihe Talaud Islands (Stones *et al.* 1997).

Table 1. Locality Record of Sulawesi Hawk-eagle.

Location	Status	Op	Total number	Composition	Elevation (m asl)	Vegetation Type
Bulusaraung	NR	Reatoa atas	1	1 im	900	LM
Bulusaraung	NR/PA	Bontosiri	2	1 im, 1 a	600	LM
Bantimuring	NR/RP	Airterjun gua batu	1	1 a	180	LS
Gn Mambuliling	PA	Pebadongan	2	1 im, 1 a	1510	UM
Nanggala I	PA	Kebun kopi Tarcojaya	2	2 a	1085	LM
Nanggala I	PA	Wayrede	1	1 a	1230	UM
Fahumpenai	NR	Sampuraga	1	1 a	1265	UM
Fahumpenai	NR	Salonoa	3	1 im, 2 a	535	LF
Fahumpenai	NR	Laroeha	1	1 a	400	LF
Danau Towuti	RP	Lengkobale	1	1 a	300	LF
Air terjun Wera	RP	Balumpewa	2	2 a	150	LF
Lore Lindu	NP	Tongoa	1	1 a	745	LM
Lore Lindu	NP	Kamarora	1	1 a	800	LM
Lore Lindu	NP	Lambara	1	1 a	420	MO
Lore Lindu	NP	Wuasa	2	1 im, 1 a	1200	UM
Lore Lindu	NP	Dodolo	1	1 a	1400	UM
Lore Lindu	NP	Tomado, Danau Lindu	2	1 im, 1 a	900	LM
Lore Lindu	NP	Dusun III Pakuli	2	2 a	140	LF
Lore Lindu	NP	Dusun II Pakuli	1	1 a	400	LF
Lore Lindu	NP	Simoro	2	2 a	315	LF
Lore Lindu	NP	Kulawi	2	1 im, 1 a	625	LF
Lore Lindu	NP	Sidaunta	1	1 a	1020	IM
Lore Lindu	NP	Puroo	1	1 a	990	LM
Lore Lindu	NP	PunNRk-Batu Salome	2	2 a	1080	UM
Lore Lindu	NP	Sedoa	2	2 a	1120	UM
Morowali	NR	Morowali	1	1 a	50	CF
Morowali	NR	Kayupoli	1	1 a	90	LF
Morowali	NR	Kolonedale	3	2 a, 1 im	40	LF
Kawaeli	PA	Kawaeli-Tobuli	3	2 a, 1 im	450	LF
Kawaeli	PA	Kawaeli-Tobuli b	2	2 a	720	LF
Tambu- Kasimbar	PA	Tambu	2	2 a	210	LF
Tambu- Kasimbar	PA	Ranang	1	1 a	75	LF
Tjg Matop	SM	Pinjan	4	4 a	200	CF
Tjg Matop	SM	Binontoa	2	2 a	420	CF
Gn. Sojol	NR	NR Gn. Sojol	1	1 a	350	LF

Note: a = adult; im= immature; op=observational point

CF = coast forest; LF = lowland Forest 0 - 700m, LM = Lower Montane Forest 700 - 1200m;

UM = Upper Montane Forest 1200 - 2100m; LS = Limestone Forest; MO = Monsoon Forest

Altitudinal Distribution

Sulawesi Hawk-eagle is distributed on elevation of 0 - 3,000 m (Coates *et al.*, 1996), but poorly known about elevation area more needed and like to this species. We was surveyed from coast to elevation of 1,800m at Mambuliling Mount and we have result that this species was record on these elevation. Lower elevation of locality record of this species is on 50m at Morowali and the upper elevation of locality record is on 1,510m at Pebadongan, Mambuliling Mount. As result of all number of elevation record, indicated to high number of elevation record on extended of 600-800 m, where most of lowland and hills forest remaining (Fig. 2).

We has no same duration of observation time in each location (extend of sample 5-14 hour), but as result, estimated to high dependence of this species to forest. When the lowland forest is more distoyed, this

species will flying up to more widely of hills forest. Moreover, based on record of each elevation locality, Sulawesi Hawk-eagle is more frequently record to be seen on 0-200m (ET=0.59), and then 600-800m (ET=0.50), while on 1,000-1,800m is rare to be seen (ET= 0.32-0.14). Cause of these all, indicated to lowland forest on good condition is has wider supporting to life of this species.

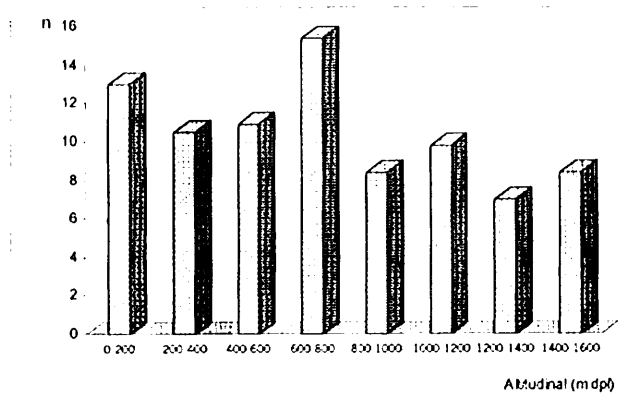


Figure 2. Sulawesi hawk-eagle distribution according individual numbers (n=62) which found on the some altitudinal sites. One individual could be recorded in some site of altitudinal category.

Estimate of Population

The homerange of a number of diurnal raptor species of *Spizaetus* genera is known. A breeding pair of *S. nipalensis* at Mt. Suzuka, central part island of Japan, has territory on 22.8 - 28.8 km²(Yamazaki, 1990) and homerange of this species at southern part was estimated on 13.65 km²(Morimoto and Iida, 1992). A breeding pair of *S. bartelsi* in Java, is estimated has a home range on minimum 12 km²/pair (Sozer and Nijman, 1995), or 20 - 30 km²(Thiollay & Meyburg, 1988). *S. ornatus* in South America has estimated homerange of male on 12-21 km² and 8 km² of female (Madrid *et al.*, 1991) (see Table 2).

Table 2. Size of Home range of Genera of *Spizaetus*.

Species	Region	Body size (cm)	Home range (Km ² /pair)
<i>S. nipalensis</i>	Asia	67 - 86	22.8-28.8; 13.65
<i>S. bartelsi</i>	Asia (Jawa)	60 - 70	12; 20-30
<i>S. ornatus</i>	South America	58 - 67	12-21/male, 8/female
<i>S. lanceolatus</i>	Asia (Sulawesi)	56 - 64	-

After Sozer & Nijman (1995)

Assuming all habitat is suitable for Sulawesi hawk-eagle, the number of population of surveyed area is between 254 - 306 pairs (Table 3). Sixty to seventy pairs are estimated occupying the surveyed area of South Sulawesi Province and 194 - 235 pairs located at surveyed area at Central Sulawesi. Thiollay (pers. comm.) based on his counting, estimated 200 number of pairs is occupying the surveyed area at Central Sulawesi.

Table 3. Estimation a Number of Pair of Sulawesi Hawk-eagle at Locality Survey.

location	Status	Size (km ²)	Altitude	Estimation number of pair
Bulusaraung	NR	80	500 – 1800m	4 – 6
Bantimurung	NR/RP	10	100 – 750 m	1 – 2
Mambuliling mount	PA	50	700 – 200 m	4 – 5
Nanggala	PA	50	600 – 1800 m	4 – 5
Feruhumpenai	NR	900	250 – 1678 m	45 – 50
Towuti Lake	RP	45	295 – 600 m	2 – 3
Wera waterfall	RP	2,5	150 – 800 m	1 – 2
Lore Lindu	NP	2290	140 – 2610 m	92 – 110
Morowali	NR	2250	0 – 2630 m	90 – 105
Kawaeli	PA	60	400 - 750 m	3 – 5
Tambu- Kasimbar	PA	50	75 - 350 m	2 – 4
Matop cape	WS	16.12	0-420m	3 – 5
Sojol mount	NR	50	500 - 450 m	3 – 4
Total				254 – 306

Note: NR=- Nature Reserve; RP= Recreation Park; PF= Protected Forest; NP= National Park; WS= Wildlife Sactuary

Habitat

The Sulawesi Hawk-eagle was recorded at coastal forest, lowland forest, lower montane forest, upper montane forest, limestone forest and monsoon forest, but no presence sign at mangrove forest, savanna, marshes, monoculture forest and cultivation area. (see appendix 2). Based on encounter rate of forest vegetation type, this species is most frequently seen in lowland forest (ET=0.114) and rare to be seen in limestone forest and monsoon forest (ET=0.005) (Table 4).

Table 4. Record of Sulawesi Hawk-eagle based on vegetation type.

VEGETATION TYPE	Number of Individual		Number of individual / 220 hour	Classification of density
	South	Central		
Coastal forest	0	7	0,032	Common
Lowland forest	4	21	0,114	Frequent
Lower montane forest	6	6	0.055	Common
Upper montane forest	4	7	0,050	Common
Limestone forest	1	0	0,005	Rare
Monsoon forest	0	1	0,005	Rare

Classification of value: 0,001 – 0,009 = rare, 0,01 – 0,099 = common; > 0,1 = frequent

In four categories of percentage of forest covering, Sulawesi Hawk-eagle is frequently seen in forest with covering area percentage of 25-50% (F2; ET= 0.101) and rare to be seen in open forest with covering area of 5-25% (F1; ET=0.016). In addition, F3 with forest covering 50-75% and F4 with 75-100% forest covering are both similar on encounter rate (see Table 5). The high encounter rate in F2 is due to the wider observational area and with only 25-50% covering area percentage offering the higher opportunity to find Sulawesi Hawk-eagle than F4 (75-100%) and F3 (50-75%). Thiollay & Rakhman (2000, *in prep.*) describing that Sulawesi Hawk-eagle is highly confined to the primary forest, and the secretive habit has been causing the difficulties on detecting the species on high vegetation cover.

Table 5. Encounter rate value based on the stratification of forest cover.

Category % Forest Cover	VEGETATION TYPE						Number of Individual / 188 hour	Classification of density	
	CF	Lf	Lm	Um	Ls	Mo			
F1 (05-25%)	3						0,016	Rare	
F2 (25-50%)	12	5	2					0,101	Often
F3 (50-75%)	7	3	5	1	1			0,090	Common
F4 (75-100%)	7	2	4	4				0,090	Common

Note: remarks of vegetation type (see table 4); result category: 0,01 – 0,05 = Rare; 0,06 – 0,09 = Common; > 0,1 = Often

Threats

Thiollay (1994) has been indicating that most currently identifiable threats to raptors in tropical forest belt are related to the habitat destruction. Other classical threats including poaching, trade or pesticide are of local occurrence and most often little significance. Three different threats are involved under general of habitat loss including deforestation, disturbance and habitat fragmentation. Deforestation is the conversion of forest to various open habitat including monoculture plantation. Disturbance is secondarisation of forest cover, resulting in an important change of the vegetation structure and in improved plant and animal communities. Habitat fragmentation is tracts leading to mosaic of forest patches and open area.

Even though almost status of all visited area are conservation area (Nature Reserve, Recreation Park, Wildlife Sanctuary and National Park) but still the management and law enforcement to protect those areas is less, as many evidences are able to be identified. We noted the various different threats to Sulawesi Hawk-eagle in almost all of visited locations. Generally, more than one variety of threat in each location with different scale has been identified. Enhancing plantation tend to be a deforestation type is mostly noted at South Sulawesi, and forest disturbance including hunting, logging, collecting rattan and encroachment is mostly happened in Central Sulawesi. (Table 6).

Table 6. A variety of threat to Sulawesi Hawk-eagle.

Kind of Threat	Number of Case *		Total
	South Sulawesi	Central Sulawesi	
Cultivation	8	4	12
Enhancement of mining area	1	0	1
Illegal hunting	3	21	24
Illegal logging	10	12	22
Rattan collection	0	13	13
Forest encroachment	2	12	14
Road building	0	1	1
Fire	2	0	2

Note = * more than one variety of threat in each location

Conservation

Local people consider all raptors are injurious because of the habit of stealing of chicken, but mostly people ignore. Beside that, poaching for trade, based on both interviewing people and visiting bird market at Todopuli, Makassar (Nurwatha & Rahman, 2000). Only one record of eagle hunting for diet was noted in

Reatoa. Even though the poaching is less, people is always revealed on the rareness of the eagle in neighborhood comparing to last ten years ago.

Contrary to the Javan Hawk-eagle in Java Island, poaching and illegal trade is now become one of important threat to this species beside habitat destruction. Javanese has a long history of keeping wildlife in cage especially bird. In a large scale, a being popular bird song contests have been triggering a massive hunting which will be affecting the population in wild. The culture and bird contest are to be afraid of being affecting Sulawesi people in where Javanese intruding Sulawesi through transmigration program which basically Sulawesi does not have any culture of captive. A program to enhance public awareness to safeguard the Sulawesi's biodiversity in where they living is highly required.

In Central Sulawesi, Sulawesi Hawk-eagle is seemingly having a healthy population in a wide area and is apparently able to survive on a level of deforestation and fragmentation in certain habitat. Of course, the species could not be surviving in a totally high threats. Habitat loss in lowland mostly occurred in area of South Sulawesi has been pushing the species to refuge to the upper habitat in hills and montane forest, it is probably that the forests in mountain area would be a last refuge for this species. The island of Java with its Javan Hawk-eagle is an example to explain that habitat loss in lowland has been forced the species to be an estranged species (Meyburg, 1986), from the habitat to be concentrated in the remained montane forest.

Raptor is often to be a sensitive bio-indicator of environmental changes or habitat quality, unfortunately, the important role of raptor, particularly in Sulawesi, is less studied or even frequently ignored. We will probably lose the opportunity to study their life when most of diurnal raptor species, especially endemic species, is extinct. To gain a general conservation strategy based on the role of the eagle, on the first phase is by conserve this species. Thiollay (1994) explained that raptor, like other vertebrate predators, are playing an important role in several respects for general conservation strategy. First, they play the role of "umbrella species" because of their large home range. Second, they are "flag-ship species" (species symbol in a broader conservation management), species arousing public interest and supporting wider conservation programmes. Third, raptor is often sensitive bio-indicator of environment changes or habitat quality, far beyond their well-known sensitivity to chronic food-chain contamination. At last, the key biological role of predators in primary rain forest begins to be appreciated.

CONCLUSION

The Sulawesi Hawk-eagle was found in 36 observational sites, including 11 observational points in South Sulawesi i.e. Bulusaraung, Bantimurung, Mambuliling, Nanggala, Faruhumpenai and Towuti, and 25 observational points in Central Sulawesi i.e. Wera Waterfall, Lore Lindu, Morowali, Kawaeli, the Protected Forest between Tambu-Kasimbar, Tanjung Matop and Mt Sojol.

Bantimurung is only the southern distribution record of this species in Sulawesi Island, and visiting north area of the island, the species is become commoner especially from Tana Toraja regency and Polewali-Mamasa, to northern Luwu and Mamuju until into boundary area of Central Sulawesi. In Central Sulawesi, the species is widely distributed on every forested area, and not an uncommon species.

Sulawesi Hawk-eagle is distributed on elevation of 0 - 3,000 m, the lower elevation of locality record of this species is on 50m at Morowali and the upper elevation of locality record is on 1,510m at Pebandongan, Mt. Mambuliling. The species is mostly found at altitude of 0-800m asl, in which the lowland and hill forest

still remains. However, the species is more concentrated in elevation of 600-800 m as a consequences of decreasing of lowland forest.

In order to counting the population number, the density of breeding pair of Sulawesi Hawk-eagle has estimated on extend of 15 - 25 km². Population number of pair of Sulawesi Hawk-eagle at all locality surveyed are between 254 - 306 pairs, 60 - 71 pairs are estimated located on surveyed area at South Sulawesi Province and 194 - 235 pairs located at surveyed area at Central Sulawesi.

The Sulawesi Hawk-eagle recorded in coastal forest, lowland forest, lower montane forest, upper montane forest, limestone forest and monsoon forest. This species was not found in Mangrove forest, savanna, marshes, monoculture forest and agricultural area. Based on encounter rate in forest vegetation type, Sulawesi Hawk-eagle is mostly seen in lowland forest and rarest in limestone forest and monsoon forest. Sulawesi Hawk-eagle is often to be seen in forest with cover area of F2 (25-50%) and rare to be seen in open forest with cover area of F1 (5-25%) In addition, F3 with forest cover 50-75% and F4 with 75-100% forest cover are compressing to the same level.

Plantation as a deforestation type is mostly recorded at northern of South Sulawesi and Toli-toli in Central Sulawesi, and forest disturbance including hunting, logging, collecting rattan and cultivation is mostly occurred in Central Sulawesi.

Local people consider all raptors are injurious because of the habit of stealing of chicken, but mostly people ignore and during observation time, no eagle in trade was recorded.

FUTURE STUDY

The study of Sulawesi Hawk-eagle will be covering all Sulawesi regions, including satellite islands. The sites to be surveyed are other part South-east Sulawesi, North Sulawesi Province and eastern continental of Central Sulawesi (Morowali area), in addition, the satellite island of Muna where is very little information about Sulawesi Hawk-eagle known.

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要 旨

スラウエシ島に生息する希少鳥類 セレベスクマタカ (*Spizaetus lanceolatus*) の 個体数、分布、生息状況の現状に関する調査

ワーユラハルジャニントウラ

低地熱帯林の減少により絶滅が心配されるセレベスクマタカについて、同種の世界で唯一の生息地であるスラウエシ島における個体数、分布、生息状況の現状を調査した。

調査は南スラウエシと中央スラウエシの全36地点で行われた。セレベスクマタカの生息域は海拔0mから800mにかけての地域であるが、今回同種が実際に確認された地点は海拔600mから800mの間が多く、下方から進む開発によって生息地が狭められていることが示唆された。調査の結果から、セレベスクマタカの現存数は南と中央を合わせて254-306番と推測される。

今回セレベスクマタカが確認された地点の主な植生は低地熱帯林であり、マングローブ林やサバンナ、湿地帯、松林、耕作地帯などでは観察されなかった。同種がもっともよく目視されたのは植生被覆率25%以上の林であり、被覆率が25%を切ると確認数はぐっと減少した。一方で、被覆率が50%を超えると目視が難しくなり、この場合も確

認数は減少した。

地元住民からの聞き取り調査や現地の見分調査の結果、スラウエシ島の森林はプランテーションに代表される土地開発や木材伐採、狩猟など多岐の理由から劣化・減少していることが明らかになった。特に近年、政治不安や経済危機を反映して森林資源の搾取が苛烈になっており、セレベスクマタカの生息地を脅かしている。

地元の住民は、家禽を襲うこともあるワシタカ類を全般的に嫌っているようであるが、積極的に駆除しようとすることはあまりなく、また売買のための捕獲等もとくに行っていないようである。鳥類の取引市場も調査したが、セレベスクマタカが売られていた形跡はなかった。

本事業では、調査と並行して、ポスターの配布を通じたセレベスクマタカの保護に関する普及・啓発活動も実施した。

(推薦者：乾 由布子 訳)