

# PROJECT GARUDA

*The Conservation effort of the Javan Hawk-eagle and its habitat  
At Mt. Burangrang -Tangkuban Perahu Nature reserve, West Java Indonesia*

## Report Team

Compilers : Pupung Firman Nurwatha, Zaini Rakhman, Idah Faridah  
Contributors : Ade Rahmat, Asep Maman Sukirman, Fassa Faisal, Yogi Satoto, Zaenal 'Jody' Mutaqin, Lidya Ariesusanti, Pungki Lupiyaningdyah, Yuni Yuniati, Jirjiz Jauhan  
Photographers : Ade Rahmat, Fassa Faisal, Ridwan Noviana, R Ahmad Hadian A.P, Zaini Rakhman  
Illustrator : Dwi Astuti (Bajing Loncat)

## Project Garuda Team Members

Project Leader : Pupung Firman Nurwatha  
Research Coordinator : Zaini Rakhman  
Research Team Members : Ade Rahmat, Asep Maman Sukirman, Dadan Ramdan, Dani Heryadi, Fassa Faisal, Jirjiz Jauhan, R Ahmad Hadian A.P., Yogi Satoto, Zaenal 'Jody' Mutaqin  
Awareness Coordinator : Idah Faridah  
Awareness Team Members : Detrizki Agustina, Fitriya Chandra Sari, Ira Ramadhani, Lia Afianti, Lidya Ariesusanti, Marthian Dwiyani, Pungki Lupiyaningdyah, Ridwan Noviana, Syamsul Hidayat, Yuni Yuniati  
Participans : Ahmad Bagja, Ahmad Sobur, Andi, Arif Risyadi, Arief Gustiawan, Boyke, Buchroni, Dea Rodiana, Dedi, Dien Kamaludin, Diki Alramdhani, Deni Sagita, Deri Ramdhani, Dwi Sawung, Eka Muliawati Putri, Eva Liana, Fiki Abubakar, Gilar Kadarsah, Imelda Billitonina, Jujun Juanda, Kurnia, Lina, Leni Yuliani Wijaya, Luppy H, Luri, Mira Yustina, Muhammad Rifky, Neneng Rossi, Predari, Puji Rahayu W., Ratna Ekawati, Risa Dameraia, Rini Sulistyowati, R.Anyana, Rully Agus, Sari Kartini, Tedi Setiadi, Teni, Tisna Wimarna, Titis Endang Widuri, Trieska, Wara Asfiya, Wita Isriyanti, Yana Sutisna, Yuni Rukminiati, Zaenal Mutaqien

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## YPAL

Jl. Paledang No. 21 Cibereum Bandung 40184, West Java, Indonesia.  
Tlp./Fax.: +62 22 6070139; E-mail: ypal@bdg.centrin.net.id; ypal@ypal.or.id.  
www.ypal.or.id

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## **PREFACE**

Project Garuda is a follow-up program of Javan Hawk-eagle research by YPAL (Indegenous Nature Conservation Society) cooperated with Himbio (Biology Student Association) of Padjadjaran University since 1998 at Southern West Java. This project is part of Recovery Plan implementation that had been established by Javan Hawk-eagle Conservation Working Group (KKPEJ). It had involved 65 volunteers mostly were college students, also Panaruban community at Cicadas Village, Subang Regency. Those volunteers were much involved on monitoring, held environmental education and radio broadcasting, and also on Javan Hawk-eagle breeding behaviour monitoring in its own nest. This project was conducted for 18 months since April 2002 until October 2003.

This report explains Javan Hawk-eagle research result and conservation efforts for this bird and its habitat at Mount Burangrang and Tangkuban Perahu Nature Reserve area, West Java – Indonesia. The research was conducted involving Javan Hawk-eagle habitat and breeding behaviour study and brief study about community and forest relationship. The conservation efforts was conducted especially to increase community awareness, both who live in the forest periphery or in the urban to joint together for Javan Hawk-eagle rescuing and its habitat.

This activity results had been presented in some government agency, such as Nature Resources Conservation Bureau I (BKSDA) West Java, including on some Nature Resource area management planning meetings. Other presentations was conducted at Nature Environmental Management Bureau (BPLHD) West Java. Research result socialization was also conducted on local community surround the forest.

Bandung, March 2004

## SUMMARY

Since Javan Hawk-eagle is declared as Indonesia Rare Animal National symbol by the president in 1993, the existence of this spectacular raptor species continued with disturbance, more often by the decreasing and destruction of their habitat quality and there is Javan Hawk-eagle hunting for trade. Javan Hawk-eagle conservation effort reference had been compiled by Javan Hawk-eagle Working Group (KKPEJ) on a Recovery Plan document in 1998 and revised in 2001. Considered important aspects on this Recovery Plan are ecology study and Javan Hawk-eagle study. More than that is real action for its conservation become priority to be done.

For 18 months since April 2002 until October 2003, YPAL was conducted Project Garuda as an effort for Javan Hawk-eagle and its habitat conservation at Mount Burangrang and Tangkuban Perahu (BuTahu) Nature Reserve forest area, West Java. Project Garuda tried to unite research activity and conservation actions involving local and urban community. Community involving was conducted through environmental education activity for elementary school students and motivate local community to be involved on forest conservation. Other achievement is to motivate urban community to aware about nature conservation through radio program, exhibition, presentation and dialog.

From Project Garuda research result, BuTahu area is a shelter for about seven pairs of Javan Hawk-eagle or about 14-20 individu. Nature forest in this area equipped main living place for them to breed and hunt prey. Inside this area was noted West Java mountain forest unique tree species characteristic, Jamuju and Kiputri (Podocarpaceae), also Bunga bangkai *Amorphophallus annulifer* as a new record for its distribution. It's also noted 26 mammals species (4 species are Java endemics), 9 amphibians species (2 species are Java endemics), 15 reptils species and 118 bird species. From mammals species, there are 15 protected animal species, 1 Critical species, 3 Endangered species, 4 Vulnerable species, 3 Near Threatened Species, 3 species noted on Appendix 1 CITES and 8 species noted on Appendix 2 CITES. New record species in this area are Java –Sunda spiny rat *Maxomys bartelsii*, endemic species in West and Central Java, and Pearly Tree Frog *Nyctixalus margaritifer*, before is known only in three locations in Java.

Javan Hawk-eagle breeding behaviour monitoring on active nest at Ciasem Block was conducted by direct observation and by using camera surveillance (CCTV). It had been known since 1998 until 2003 in this nest location was estimated Javan Hawk-eagle breeding about five times, succeeded twice and failed three times. For the last one year, it is noted they laid eggs three times, failed twice and the last was success to hatch but then the eaglet was gone. Time range between first egg to the second egg was about six months, then laid egg again in three monts. After the third failure as the lost of two-day-old eaglet, the pair was not come back to the nest, but they were still around the nest. The eaglet living survival failure assumption was caused by very bad weather on the first two days when the egg hatched, and then the dead eaglet was thrown by parents. It is not recorded the present of predator in nest, and human disturbance during observation was minimalized.

Nature forest disturbance as Javan Hawk-eagle main habitat is very high pressure, mainly from human activities such as illegal logging and forest clearing for agricultural land purpose. Forest destruction above had become main attention considerate this area is truly "Forest Island" surrounded by settlement. There are 20 villages who have direct border with forest area, the population is about 88,548 in 1996. In other side, the existence of the area benefit was endured directly especially by local people in those villages, they are commonly used forest for daily needs such as water resource, fuelwood, material building and food.

Environment education for elementary school (SD) was conducted to increase young generation awareness and attention. This program was followed by 167 pupils from two elementary schools, 52 pupils from Sangkuriang Elementary School and 115 pupils from Hikmah Teladan Elementary School. This program was implemented on eighteen times meeting activities with pupils in six months involving about 40 volunteers. The environment education was emphasized on environmental ethics implementation to pupils. The pupils changing behaviour after following environmental education was reported by their teachers and parents. Pupils seemed having more wide of knowledge and perception, their language and behaviour of environment were also better. Teachers reported there were positive changing about environment of their pupils so they wanted to continue environmental education project. This program was succeeded making environmental education modul, especially for elementary school pupils. And the team was established NaturLikeE (Ethical Little Naturalists) Environmental Education program to follow up this opportunity.

The awareness team also was conducted some activities involving mass media to increase urban community awareness. These activities included working with mass media training for Project Garuda team member, also followed by participations from university students and other NGOs. This training presented keynote speakers from electronic and printed media experts. Other activity was talkshow of Project Garuda expose for mass media especially in Bandung community, attended by mass media, press, university students, government bodies, NGOs and academics. The team also was held radio broadcasting in RRI (Radio Republic of Indonesia) West Java Regional and Rase FM Radio Bandung. A broadcast package modul had been conducted at RRI West Java Regional for three months. Broadcasting material is contained with informations about wildlife and its habitat conservation, also containing about environmental problem within community. This program had great response from RRI and audience, also including keynote speakers from many parties such as NGOs, government bodies, students and artists.

Exhibitions and dialogue were other form of activities conducted by Project Garuda team to increase community awareness about the importance of wildlife conservation, especially for Javan Hawk-eagle and its habitat. There was no exhibition special held by Project Garuda or the theme was special about Javan Hawk-eagle. Project Garuda team was invited to fill in stand on five environmental exhibition activities in west Java Province, held by other institutions such as universities, regional government or other NGOs. Beside attended some environmental exhibitions, the team was also active making four presentations and dialogues with government, PHPA and university. The team was also conducted several meeting with local community in Panaruban to motivate them about the importance of forest conservation as their livelihood source. The community was aroused then to conduct some activities to use nature resources potential without any harm. One of their plans was developing education tour surround their villages.

Project Garuda team made stickers about Javan Hawk-eagle rescue and water resources to support communication process, both on presentations and dialogues, and on meeting with community. This materials was spreaded freely, both as gift or prize. Material spreading media was through environmental education activities, exhibition in Bandung, Subang and Jakarta, presentations and seminars, direct spreading to some government institutions and community surround Bandung, Subang and Cianjur.

## **ACKNOWLEDGEMENT**

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Perhaps it's all just planning if we didn't get financial support and research permit on implementation. We are very pleased and thankful to BirdLife International, Beyond Petroleum and Fauna & Flora International to support our program through BP Conservation Award. We also thank to PILI-NGO Movement who trusted us using their fund for camera surveillance improvement on Javan Hawk-eagle behaviour study in its nest. Research permission was also easy to get of the kindness from Head of Nature Resources Conservation Bureau (BKSDA) I West Java, Head of Regional I BKSDA I, West Java, Forest Public Company III (Perum Perhutani III) West Java and Plantation Public Company (PTPN) VIII Ciater. And we thanks for area management parties for their trustees for us to conduct activities in their own area.

During all activities, our friends are joined in Javan Hawk-eagle research and awareness team, and also Panaruban community, have shown their great gladness and enthusiasm to take part in the activities. We are pleased to thank: Bird Conservation Society (BICONS), HIMBIO (Biology Student Association) Padajadajaran University, Indonesia Education University (UPI) volunteers, and Mr. Dede Udung and his family for his settlement as our base camp during activity. We also thank Wahyu, Rudi, Dusep and our friends in Panaruban Youth Association, and Cicadas Village administration for their moril, material and safety supports when we camped in the forest about four months to monitor Javan Hawk-eagle and Sangkuriang and Hikmah Teladan camping activity at Panaruban area. We are very helpful of Mr. Akurroji and PGRI friends assistance on picohydro construction, then it had been completed by assistance of Rosad and Herman from Mount Simpang Nature Reserve community.

Community awareness was including environmental education activity, radio broadcasting and exhibition has got great support from so many parties. We are thankful: Sangkuriang and Hikmah Teladan Elementary School students, teachers and parents, their support lift our courage to share our experience with all students; RRI (Radio Republic of Indonesia) Bandung and Rase FM for their broadcast time so we can campaign nature conservation to so many radio audiences; Mr. Rohadji Trie, Mr. Drs. Safaat Saniatmaja (RRI), Mr. Tri Irwanda (PRSNI/Mara FM), Mr. Muharam (Performa Optima), Mr. M. Ridho Eisy (Pikiran Rakyat Newspaper), Mr. Hilmi Salim MSc. (Padjadjaran University) and Mr. I Nyoman Nuarte (artist) who had been keynote speakers on campaign activity through mass media; Jakarta As-Syafi'iyah Islamic University Birdwatching Club, Environmental Technique Department ITB (Bandung Institute of Technology), Bioscience and Biotechnology Development Foundation (YPBB), Indonesia Education University (UPI), and West Java Nature Management Bureau (BPLHD) who had invited and equipped exhibition stand for Project Garuda Awareness team.

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# Part A

## INTRODUCTION

### 1 BACKGROUNDS

#### 1.1 The Javan Hawk-eagle

The Javan Hawk-eagle *Spizaetus bartelsi* is an endemic raptor to Java Island. This bird is playing a role as *top predator* in foodchain cycle maintaining population of preying animals in wild, therefore its function in sustaining natural balance is vital. In the last recent years, their distribution area have been fragmented, which is estimated only 10% of area remained. So there is an increasing threat that the population in westside and eastside of Java Island will appart. Beside that in the few recent years, the illegal trade even also more increased with the very high level threat, resulted the population tend to decrease (Sozer, dkk., 1999).

The spesific field study to count the population of Javan Hawk-eagle in entire Java Island has not been conducted yet. A number of partials studies about distribution, population and behaviour of the eagle had been conducted in the last ten years (van Balen, 1996; Sozer & Nijman, 1995; Sozer et.al., 1998; Nijman 1994; Röv & Gjershaug 1998; Setiady, et.al., 2000). However, a rough estimation of the population has been made base on extrapolation of habitat requirement size by a pair of Javan Hawk-eagle to the number of suitable habitat. Moreover, consideration is also resulted from new findings in the field until early 1999. Combination from the newest information about ratio between adult bird and immature bird produce new estimation of population, which is between 141 until 204 pairs or about 600 – 1000 individual (van Balen et al., 1996).

The exist number of Javan Hawk-eagle population seems to make this species as endangered species according to IUCN criteria since ten years ago. This criteria put the eagle into species that have opportunity to extinct > 20% in time frame of 20 years. The conservation efforts has been arranged by Javan Hawk-eagle Conservation Working Group (KKPEJ) in a Recovery Plan document in 1998 and had revised in 2001. The important aspects considered in the recovery plan is aspects study of ecology and behaviour.

The Javan Hawk-eagle was protected by Indonesian Law on Act No. 5, 1990, also Government Regulation No. 7 and 8, 1999. Apart from protected animal, this species also earns special apreciation from Indonesian Government. On January 10, 1993, President of Indonesia established this spectacular raptor as Indonesian National bird and also as symbol of all rare species because its rareness and uniqueness. Another reason is Javan Hawk-eagle has similarity with Garuda, mythical bird an emblem of Indonesia State.



## **1.2 Garuda**

Garuda's origins in Indonesia go back to the time, around the first century A.D., when sailors and traders from Southern India first came to the shores of the fertile islands looking for rice and riches. Not only brought goods and techniques, they also brought their literature. In this literature, there were the stories of the origins, or *Puranas*, with the story of *Garuda* among them. The locals soon made these stories their own in a Sanskrit derived language called *Kawi*. It is in the earliest text of this literature, the *Adiparwa* (10th century A.D.) that the story of the mighty *Garuda* bird is found. The *Garuda* story is a teaching. It tells us that *moksa*, the ultimate release, symbolized by the water of life, can be reached only by our overcoming the earthly bonds symbolized by the snakes (naga/dragon).

Now, modern *Garuda* is the official emblem of the Indonesian state substance state principal, *Pancasila*, and its motto *Bhinneka Tunggal Ika* (translated as Unity in Diversity). Thus *Garuda* arrived at the end of the road, further away from the Hindu origins. He started as a god and a religious tool of power. He gradually lost his godly quality while retaining his function of guardian of a still sacred power. After Indonesian Independence (1945), he has become both the emblem and the instrument of cohesion and power of a modern nation. This modern emblem is different from traditional *Garuda*, it is real as eagle and not just an anthropomorphic figure from a mythical character.

## **1.3 Species as a Symbol**

Since the Javan Hawk-eagle declared as symbol of National Animal and Symbol of Indonesian rare animal, this species is still having unexpected treat from determination of its status. On the contrary, direct threat in the form of poaching for commercial still happens. Community perception about wild animals commonly is still limited to those animals that can complement house decoration by captive it. Most part of community still live an opinion that keeping wildlife in captivity is part of conservation, because it will maintain the existence of the animal, eventhough they seldom think about the status of animal and its habitat, more over to have a program to return back to nature.

There is a government initiative to set forth particularly species as a national or regional symbol hoping can encourage people to active on natural conservation. In fact, the efforts have not been well disseminated yet to wide community, but seem to be only understandable by researchers and NGOs that worked on wildlife conservation. Even to local governments, mostly they do not know yet, far from comprehending.

The species issue has not yet become a reinforcement to ward off the forest destruction. Many people think that conserving the species does not give any contribution in helping community to overcome their economical problem, after economical crisis hampered this country development. They always ask the priority between conserving animal or human. Sometimes the opinion still emerges that an effort to conserve does not take side or even contradict to the increasing the level community life.

The species conservation has not yet become an entry point for ecosystem conservation effort, even ignored sometimes. It is more dominated by spacial matters, in this case is the struggle of land management system. It is an interesting matter to combine species conservation issue with community empowerment to save the forest. Or at least, species conservation issue take position as supporter that quite capable in forest conservation effort.

#### **1.4 Project Garuda**

Project Garuda (PG) is inspired with combining species issues and community empowering to conservation activities. PG has an interest with animal and habitat issue to emerge again the local community pride for biodiversity that own, with the Javan Hawk-eagle, the national rare animal, as entry point. The community based forest protection is an opportunity that can not be neglected to save the remain Java Island forest.

The aim of PG is to save the Javan Hawk-eagle and its habitat in Mt. Burangrang and Tangkuban Perahu (North of Bandung) through sustainable monitoring and research integrated with community awareness. Meanwhile, activities to achieve the aim are a) monitoring habitat and behaviour study of Javan Hawk-eagle using camera surveillance; b) to know further the community condition around the forest area; and c) result of these research as a material for awareness efforts for community around forest and citizen, covering awareness for local community especially for elementary student, conservation campaign through radio, producing awareness materials including environmental education module and awareness kit about the important of Javan Hawk-eagle and its habitat. The expected results from PG are a) A complete documentation about Javan Hawk-eagle habitat preferences and breeding behaviour in Mt. Burangrang-Tangkuban Perahu; b) Increasing grade of public involvement on conserving Javan Hawk-eagle and its habitat, and c) Providing and distributing environmental education module to elementary schools.

PG team get support from more than 30 college students come from several universities as volunteers, especially on awareness program. Four of them do a research about Javan Hawk-eagle for final exams, which are about incubation behaviour of Javan Hawk-eagle, the habitat preferences on characteristic of Javan Hawk-eagle nest, study of ethnobotany and water catchments area. Project Garuda cooperates with Bird Conservation Society (Bicons) to assist in planning and coordinating all activities in field. Beside that, the local community involvements in implementation become undeniable part.

## **2 BURANGRANG AND TANGKUBAN PERAHU**

Burangrang and Tangkuban Perahu are the name for two areas of forest nature reserve (NR) in West Java. Both names have a closed relation with the legend story of West Java people about Sangkuriang, a powerful man who want married Dayang Sumbi, which in turn out is his mother. Based on this legend story, the word of Burangrang has meant a layer of tree branches

that mounted up when Sangkuriang wanted to build boat as term of his marriage to his mother. Because the mother was hesitant to be married by her son, thus she made the time limit of making the boat by Sangkuriang faster. Sangkuriang failed to fulfill the time target, he was so angry and then the almost finished boat kicked out. The boat was thrown and turned over and became a mountain, which by then named Tangkuban Perahu which means a reversed boat. Stare at from Bandung City, the Mt. Tangkuban Perahu looks like a reverse boat accordingly. Out of that, further in this report, the combination of two forest area is abbreviated as **BuTahu** (**Bur**angrang – **Tan**kuban **Perahu**).

## 2.1 Geographical Position

The mountainous forest of BuTahu is located in the heart of West Java Province, about 20 km at Southwest Bandung, capital city of the Province (Figure 1). Geographically, Burangrang NR is located between 107°31'17" – 107°32'56" E and 6°41'45" – 6°43'18" S, and Tangkuban Perahu NR is between 107°30' – 107°40' E and 6°40' – 6°50' S. Administratively, Burangrang NR is located in four sub-districts area and two regencies, which are Wanayasa Sub-district, Bojong Sub-district and Darangdan Sub-district, District of Purwakarta; and Sagalaherang Sub-district, District of Subang. Meanwhile, Tangkuban Perahu NR/Recreational Park is located in two districts, which are District of Bandung and District of Subang. Based on the bordering area, generally the boundary land use has a several of type, which are community's agriculture land, industrial crop forest and tea plantation (Table 1). This area truly looks like an island in the middle of human settlement and agricultural areas (Figure 2)

Table 1. Boundary of Butahu area and land use surround it

<b>Area boundary</b>	<b>Burangrang</b>	<b>Tangkuban Perahu</b>
Northside	- Community tea plantation - Agriculture land and settlement	- Agriculture land and settlement
Westside	- Agriculture land and settlement	- Production Forest of Perhutani [Situ Lembang]
Southside	- Production Forest of PERHUTANI	- Production Forest of PERHUTANI - Agriculture land and tea plantation
Eastside	- Production Forest of PERHUTANI - Mt. Tangkuban Perahu Nature Reserve	- Ciater Tea Plantation (PTPN VIII) - Agriculture land and settlement

## 2.2 Wide of Area

Total area of nature reserve that established in 1979 is ca 4.360 ha, consisted of ca 2.700 ha Burangrang NR and ca 1660 ha Tangkuban Perahu NR/RP. However, if protection forest area in surroundings compiled, the total area of natural forest could reach 5.000 ha. Borders of the two nature reserves have not yet been established until now; therefore, a probability of this area to be increased or even decreased is occurred while on the recalculation border on September - October 2003.

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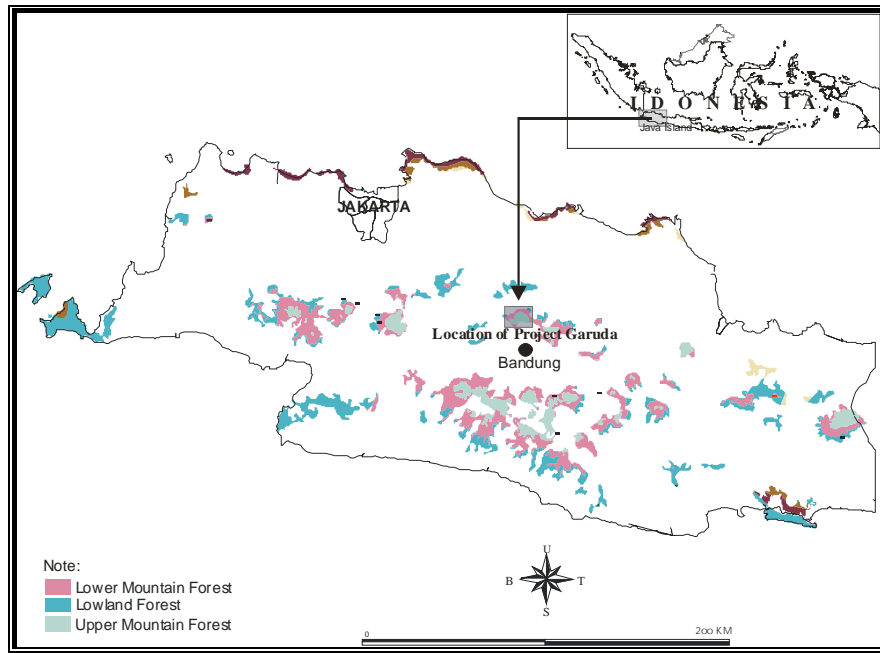


Figure 1. The Project Garuda Location



Figure 2. The BuTahu forest area seen from satellite imagery year of 2000

### **2.3 Biodiversity**

A comprehensive biodiversity research in BuTahu area has not yet been conducted, although these nature reserves have been declared since 25 years ago. The manager of nature reserves, which is BKSDA itself, has not yet been conducting a base-line study, but only anecdotal records of routine forest patrol activity. Other recent research activities were only limited to few brief surveys for specific purposes, such as Javan Gibbon existence survey taken by Konus, specific insect and bird species surveys by student of Bandung Institute of Technology. In 1998, a brief survey of flora and fauna was conducted by Biological student of Padjadjaran University in Protection Forest of Situ Lembang area. Conspicuous studies were only on Javan Hawk-eagle, such as in 1994 by Nijman and in 1998 by YPAL. In 1999 vegetation analysis around nest of Javan Hawk-eagle was conducted (Setiadi et al., 2000).

According to BKSDA report (1997), the main stipulation purposes of these nature reserves were for ecological, hydrological, cultural protection and research. The specific purpose that is for protection species of Javan Endemic vegetation, such as *Anaphalis javanica*, *Rhododendron javanicum* and *Vaccinium sp.*, that considered being very important for science. From several researches result, this mountainous forest harbours 70% mountainous restricted bird species to Java, including five globally threatened species and one characteristic species of important bird area (Rombang, 1999). Three species of Javan endemic primates, which are Javan Gibbon *Hylobates moloch*, Grizzled Leaf Monkey *Presbytis comata* and Silvered Leaf Monkey *Trachypitecus auratus* can be found in this area. Beside that, also there are rare animals species such as Pangolin *Manis javanicus*, Leopard Cat *Felis bengalensis* and Leopard *Panthera pardus*.

In all over the forest area, seven encountered locations of Javan Hawk-eagle had been recorded, which were three locations in Burangrang area and four locations in Tangkuban Perahu area. Those locations in Burangrang were in Blok Komando, Curug Cijalu and Curug Cipurut, and in Tangkuban Perahu area were in Panaruban/Ciasem, Mt. Sunda, Sukawana and around Domas Crater. The population encountered in 1998 was between 7-9 pairs, consisted of 2-3 pairs in Burangrang and 5-7 pairs in Tangkuban Perahu. Two locations of nest, which were in Blok Ciasem and Cijalu were identified (Setiadi et al., 2000).

## **3 COMMUNITY**

BuTahu area was surrounded by 20 villages that directly faced with the forest. According to 1996 village pornographies (BKSDA, 1997 eds.) it was populated by 88.548, of these 25.170 peoples lives near Burangrang and 63.378 lives near Tangkuban Perahu. The village covered a 11.260,56 hectare, consisted of 8.636,49 hectare of community land area, and 2,624.07 hectare own by plantation company. The community land was depended on the existance of the water, in the form of paddy ricefield and pond covered 37,96% of all area or 4,274.29 hectare. Number of people that depend on their farmland, as a farmer or farming worker, had the highest proportion among the other productive ages about 19.514 life or 54.60%.

The existence of BuTahu forests is very important as “water tower” that providing valuable water supply for the local communities and other lower areas, Bandung, Subang and Purwakarta. Local people have taken an advantage from the forest in the form of water supply that fulfilled their need of household, sanitation and farming. The forest lost or destruction give a great bad impact, not only for the local community but also for the citizen live in those three cities.

This conservation area was still on the shadow of high number of threat such as logging, deforestation, animal hunting and others. Yet, the study about local community and its forest relationship still less conducted, especially about forest conserving effort that involving the local community. On this moment, a brief study about relation between the local community and the forest had been conducted. Rapid Rural Appraisal method was used in three village namely Cicadas, Nagrok and Cipancar.

### **3.1 Forest and Community**

Water as people basic requirement was resulted from forest existance. At least 15 rivers flew from that area, three rivers, Cimahi, Cikahuripan and Cisarupan rivers, flow through Bandung. Seven rivers, Cipurut, Cisarap, Cisair, Cislada, Cibakom, Cislak and Cibojonghonje rivers flow through Purwakarta and other five, Ciasem, Cilamaya, Cilemper Cikondang and Cimuja rivers flow through Subang. Those rivers become the root of lives for the local community and the others below.

Other forest benefits for community near the forest were as building material and fuel wood source. Whereas, also in some places became source of traditional medicine, esthetic/decorative plant and additional food. Non timber forest products that were used by Cicadas community for additional food, such as *lember* (mashroom forest), flower of *kole* (wild banana), fruit of *Castanopsis argentea* and leaf of *Pilea microphylla*. The community also sold the non timber forest product such as honey, orchid, maranggani bamboo (for decoration) and bamboo (for handycraft). Animal, especially bird, is part of non timber forest product that used, only that collected the forest product in nature reserve is prohibited, moreover there is some protected animal species.

Generally, local community were still utilizing forest to fulfill their habitual needs, such as fuel wood, building material, source of water and also hunting game area and as panorama view (Table 2). Forest exploitation should become main concern of area manager, but until now the activity of exploitation forest product illegally and unsustainable still keep continuous. It was needed an alternative diversion of activity and fulfils the community necessity, so the disturbances of forest could be handled well.

The community has paid the cost of forest destruction, in a matter of water shortage, landslide and loss few animals. They realized that the forest was very useful to prevent those accidents. They were also disagreeing with destructed forest activity, yet the cooperative effort against it had never come to the surface. It's probably caused BKSDA as nature reserve organizers have

no clear program which understands by community. It was understandable until this moment that they were still less care with the forest protection effort, although in general they were ready to help and involve conducting protection forest program.

Table 2. The community perception of forest in three villages

	<b>Nagrok Village</b>	<b>Cipancar Village</b>	<b>Cicadas Village</b>
Forest benefit	Water source, building material, fuelwood and recreational place	Water source, building material, and fuelwood	Water source, building material, fuelwood, prevent landslides, medicinal source, decorative plant and additional food
Forest destruction impact	Water shortage, Dry rice fiels, lost some animals, landslide	Water shortage, aridity and landslide	Water shortage, Lost some animals, Landslide
Forest destruction action	unagree; agree if conducted in the name to fulfill community needs	Unagree with destruction of forest	Unagree with destruction of forest
Forest protection by forestry official	Less known by community	Less known by community	Less known by community
Community awareness	Less attention	Less attention of forest problem	Commonly not care
Community involvement	Agree to involve and support the officials	Agree to involve in forest protection	Ready

### 3.2 Local Stakeholder

The BuTahu forest area and surround it has been organized and utilized by governmental agencies. The nature reserve area was organized by The West Java Natural Resources and Conservation Bureau (BKSDA II) with organizer unit by the Sub Section of West Java Conservation Region. The protected and timber forest was organized by The III National Public Company of Forestry West Java, including nature tourism site of Tangkuban Perahu Tourism Park and Curug Cijalu. The tea plantation was controlled over the Nusantara VIII Commercial Plantation Company, a national company that has been operated since Dutch colonial ages. Meanwhile inside the protected forest lies Situ Lembang between both nature reserves, this organized and become training site for The Special Army Commando (KOPASSUS). Nevertheless the Bandung and Cimahi, Regional Drinking Water Company (PDAM) is depended on its water source. Those situation make the management and organizing that area seem to be a very complex thing to do, especially the cooperate program and or to conserve rest of the forest are still unavailable.

The protected and production forest existence at the beginning raised the hope to give a benefit for nature reserve area just because the forest could act as a buffer zone. Unfortunately, it came

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out as a contrary when those areas changed into farmland. Forestry Company produces the forest management together with community program (PHBM program). Actually, its aim to prevent their land take over and illegal logging also motivated the community involved in take care of the forest. Unfortunately, the implementation was not going well for many reasons 1) All land has been clear out, neglectful the slope and unplanted by tree so erosion could easily happen, 2) forest accessibility came more easier, which mean forest destruction came more easy also, 3) unclear border between the timber forest and nature reserve has made few nature reserve area treats as timber area. This condition has influence to the nature reserve area. Beside that, forest utilization, by local community for fuel wood, non timber forest product and animal hunting game became more and more uncontrolled.





## Part B

# RESEARCH & MONITORING

## 4 METHOD

### 4.1 Study of Habitat

To describe the type of habitat, a qualitative method by exploring all area was carried out. On several observation lines, plant species inventory along the lines was conducted (Table 3). A quantitative method was applied on several types of habitat by using nested quadrat and diagram profile methods.

Table 3. Lines of vegetation recording

<b>Rute of observation</b>	<b>Type of habitat</b>
Panaruban – Ciasem <i>via</i> Mandala	Tea plantation (treatment and untreatment), production forest, kaletes, secondary forest, primer forest
Panaruban – Ciasem <i>via</i> Pasir Menyan	Tea plantation (treatment and untreatment), production forest, Eucalyptus, secondary forest
Panaruban – Julang	Tea plantation (treatment and untreatment), production forest, <i>Strobilanthus sp.</i>
Pasir menyan – Ciasem	Natural forest
Cisalak – Barutaringgul – Cibakom	Natural forest
Cikondang – Mt. Sunda	Tea plantation, pine forest, natural forest

### 4.2 Faunal Monitoring

Fauna inventory to identify and to monitor the existence of wildlife species in observation area was conducted. The wildlife species observed were mammals, birds, reptiles and amphibian. Data collecting of fauna was conducted by broad survey. Every species seen was recorded on species name and its location, both directly found or on its markings (sounds, feces, footprints, claws marks etc). Beside direct found in field, the data of fauna was also collected based on local information. The intensive location for fauna inventory was conducted in Ciasem-Panaruban and surroundings.

### 4.3 Monitoring of Javan Hawk-eagle

Monitoring of Javan Hawk-eagle occurrence was conducted by visiting some previous recorded locations and searching in new locations. The total number of surveyed location was 29 points of observation, covering nine locations in Bandung District area (Top of Mt.

Burangrang 1, Top of Mt. Burangrang 2, Cijanggal, Nyalindung, Lawangangin, Cisurupan, Pasir Tarikolot, Situ Lembang and Tangkuban Perahu Crater); thirteen locations in Purwakarta District (Curug Cimanahrasa, Cileungsing, Curug Cisarap, Cibakom, Curug Cislak, Cislada, Cisair, Pasir Limus, Batutulis–Cisair, Cikadu, Cipulus, Sarongge and Bukit Taringgul), and seven locations in Subang District (Ciasem, Cipancar, Curug Cikondang, Curug Cilemper, Gunung Sunda, Pasir menyan, Mandala and Pondok Marjuki-Curug Cijalu) (Appendix 01).

Besides survey of Javan Hawk-eagle existence, in the same time we conducted survey to find the Javan Hawk-eagle nest, particularly in previous recorded locations, which were at Cijalu and Ciasem (Setiadi et al. 2000). Approachment of nest searching in other locations was based on the characteristic description of recorded nest, mainly in habitat location near stream line.

The time period of the first field survey was carried out on June to November 2002, and the second field survey on February to October 2003. Every location was observed vary between 2 to 4 days.

#### **4.4 Breeding Behaviour**

The observation of Javan Hawk-eagle behaviour was monitored using camera surveillance, beside direct observation using monocular. Breeding behaviour was described using *scan* sampling and *adlibitum* method.

The location of camera surveillance instalation was on an active nest in Ciasem that located in eastside of Tangkuban Perahu. The camera instalation was conducted on 24-25 May 2003 at the end of hatching period of the second breeding. The intensive monitoring through camera surveillance was carried on for three months, began on May until August 2003.

Two camera surveillances were installed at a tree adjacent to the nest with each distance about 20 meters and 50 meters from the nest. This distance of camera could not get more closer since the branches of the tree nest was fragile and concerned would disturb the breeding process. Every camera was wire-connected along 400m to a screen monitor and recorder at flying camp. The flying camp was hidden at the river bank of Ciasem. The closer access to the location was through path ways passing production forest and natural forest about one and half hours from Kampung Panaruban. This location became main place of nest monitoring through screen monitor, beside that, also became a center for observation and other research activities.

At the first planning, screen monitor and recorder would be placed at Kampung (hamlet) Panaruban to be one of the campaigning media for community. Considering the feasibility study on location and financial needed, the direct instalation of camera with relay system to settlement was impossible. Therefore, the instalation scheme was changed to direct recording using recorder at the flying camp. To gain electricity in operating the camera surveillance, an environmental friendly electricity power in the form of *picohydro* was built. Ciasem river had sufficient water debit to operate *picohydro* waterwheel. The Garuda team cooperated with

community from Kampoong Panaruban made an artificial river channeled to a steep cliff about 50 meter to north of flying camp. The stream of artificial river was then kept in a little dam before channeled in pipe to *picohydro*.

## 5 RESULT AND DISCUSSION

### 5.1 Habitat

Mount Burangrang and Tangkuban Perahu Nature Reserve are two nature reserves that only separated by 500 meters of protection forest. The two mountains form a horse-shoe-like mountainous tropical forest area. In the middle part, Situlembang Lake is surrounded by natural forest under management of Perhutani. Production forest and plantation become the outer border in most part of nature reserve area, before meet agricultural and settlement area. This condition forms a habitat gradation which almost similar at all edges. Started with the inner side of area is mountain forest, than production forest, tea plantation and local agricultural area and also settlement respectively.

The vegetation inventory on observation lines recorded 137 species of trees and bushes (see Appendix 02). From all species of vegetation, a rare parasitic plant species *Amorphophallus annulifer* was recorded. This species is a new distribution record to Mt. Tangkuban Perahu. This species includes Aracea family, which indicates that the area still harbours plenty of ungulata species, like deer. Two individuals of *Amorphophallus* were found not too far from the Javan Hawk-eagle nest tree which had total high about 3 (three) meters. Two unique species characteristic of mountainous forest in West Java i.e. *Podocarpus imbricatus* and *Podocarpus neriifolius* were also recorded. In Mt. Sunda included BuTahu complex a *Podocarpus imbricatus* tree with diameter over 150 centimetres was found.

#### 5.1.1 Vegetation Gradation

In this section we describe a plant composition changing which consisted of the habitat type changing from settlement to the nature reserve area. The location described here is a condition between Panaruban and Ciasem area. At least there are three types of main vegetation including tea plantation, production forest of Eucalyptus and Strobilanthus, and the natural forest of Ciasem.

##### 1. Tea Plantation - Eucalyptus

Panaruban is a well-maintained tea (*Camellia sinensis*) plantation area and managed by state-owned company, PTPN VIII. The edge of the area borders eucalyptus forest surrounded by uniformed canopy layers of not maintained tea shrub. The lower layer is dominated by under canopy resistant shrubs i.e. *Hyptis sp.*

The riverside of tea plantation area are usually unplanted. In this location, many kind of plants grow, which form a character of ceral vegetation, such as *Homalanthus*, *Saurauia*, *Litsea* etc. A number of big trees like *Strobilanthus sp.*, *Schima walichii* and bamboo, also can be found. The composition forms a vertical structure that consists on three strata. The highest stratum canopy is unconnected between; the second layer is growth by dense poles and saplings, the last layer covered by various shrubs which indicates human activities occurrence on the area. On the steep riverbanks grow *Alpinia sp.* and *Costus speciosus* (Zingiberaceae).

Another composition is the forest edge which lies between the tea plantation and natural forest, such as at Mandala and Legok Sereh track. The location has a similar species to those are occurred in tea plantation area, shrubs and forest area. Generally, this vegetation type includes to ceral vegetation type which has higher level of disturbance. The area has three layers of canopy, the highest consist of *Ficus variegata*, *Homalanthus sp.*, *Mallotus paniculatus*, *Ficus glossuroides*, *Villebrunea rubescens*, *Litsea sp.*, *Eupatorium odoratum*, *Schima walichii*, *Strobilanthus sp.*, *Ficus fistulosa* and *Saurauia sp.*; second layer form of shrubs such *Eupatorium odoratum*, *Alpinia sp.*, *Macaranga sp.*, *Villebrunea rubescens*, *Litsea*, and other types of pole and seedling; while the lowest layer consist of *Curculigo capitulata*, *Clidemia hirta*, *Hyptis sp.*, *Lantana*, *Ageratum conyzoides* and grasses.

Between Mandala and Eucalyptus forest, there is an open area that planted as farmland by local people. Economic-valued plant that planted by local people are chilies, tomatoes, beans and cassavas. On the cleared and unreplanted area is covered by dense shrubs. The dominant species are *Eupatorium odoratum*, edible ferns, *Lantana camara* and *Ageratum conyzoides* and grasses are common to grow. *Polygala paniculata*, a specific medicinal plant, also grows on that area.

## 2. *Eucalyptus - Ciasem*

Eucalyptus forest is a production forest that planted for almost 100 years ago. The average diameter of the trees reaches almost to 100 cm. Its floor is covered by various plants categorized as poles, saplings and shrubs. The area between eucalyptus forest to natural forest in Ciasem is a secondary forest growth which is suffering a great logging activities. Many of tree seedlings could be seen because sunlight can easily penetrate the floor that allows lower vegetation, rattans, pandanus, *panggang cucuk* and edible Zingiberaceae to grow.

Closer to Ciasem natural forest, human interferences is more and more insignificant. However, logging occurs on a small number of big diameter trees. The disturbance apparently had been occurred for many times, indicated by some area dominated by old growth *Villebrunea rubescens*. The species can be found only in secondary forest, since the species needs a direct sunlight to grow. A temporary-made sawmill-like also found within the forest to subtract the log into block of woods make easier to carry out of the forest.

## 3. *Ciasem and surroundings area*

Ciasem is location where the Javan Hawk-eagle's nest observed by our team. Generally, this location is a forest on secondary succession phase (Juniarto, 1999), and the structures form

four strata. The vegetation composition on first stratum is *Quercus sp.*, *Castanopsis argentea*, *Memecylon rostatum*, *Eugenia cuprea* and *Schima walichii*. Second stratum consists of *Ficus fistulosa*, *Ficus variegata*, *Castanopsis argentea* and *Villebrunea rubescens*. Third stratum consists of *Laportea stimulans*, *Macaranga sp.*, kiraray, kisureuh, seedling of *Litsea*, Zingiberaceae, seedling of *Ficus spp.* and lowest stratum consists of xerophytes like *Melanostoma*, *Pilea microphylla* and seedling of rattans.

This location is often visited by trees and bamboo loggers. Next to the nest tree, an old sawmill and tree stump that just cut out remain. In the western side, crossed over Ciasem River, Gombong bamboo cluster occurs, which is utilized by people as plaited materials. People just come to the location only to cut and bring the bamboo out. More to the west, the condition of forest seems to be still in its natural condition

Northern side of Ciasem is a hillside that facing to the Javan Hawk-eagle' nest, which also suffered a lot of destruction. At the first time of surveys, eleven 40 – 50 cm diameter trees have been cut out and usually from the species of *Eugenia cuprea*, *Schima walichii* and *kibeusi*. . The lost of the trees seem to break the canopy continuity that affecting the arboreal species movement such as Black giant Squirrel, Silvered leaf Monkey and Javan Gibbon. This cleared area has been covered by tree seedling and rattans form a dense of shrubs.

The eastern side of the nest to Pasir Menyan has suffered more serious destruction, with remaining tree stumps, and also animal poaching. The most serious destruction that has ever been made is an off-road mobile track cut through to Curug Cijalu, but it is fortunately unrealized and the track is experiencing a forest succession. According to local community, the destruction started in the middle of 2000 after government released a policy to utilize the slumber lands in connection with economical crisis. Before the year of 2000 the condition was still on natural condition and the community uncourageous to bring woods out of the forest.

### **5.1.2 Type of Habitat**

#### *a. Natural Forest*

Vegetation type of the area is lower montane forest type and small part at the top is upper montane forest type. In Mt. Tangkuban Perahu, there is a specific type of vegetation which is unique characteristic of volcano mountain area. The species are *Vaccinium lucidum* and *Polypodium spp* which is live dominated in around the crater.

BuTahu area still has a small part of virgin forest which can said almost remains intact. In referring to the human activities in the forest, two condition of forest were occurred, which are forest that having a little disturbance and heavy disturbance. The little disturbance exist in steep areas in the middle part of the nature reserve area. Human disturbance usually in form of path ways of forest explorers and people who searching *lember* (wood mashroom), honey and other non-forest timber products. Outer area, mainly in lower place and close to settlement was natural forest which heavily disturbed. The heavy disturbance category is logging and

forest encroachment for farmland. The abandoned clearance area form secondary forests which is found in several locations inside the area.

*b. Production Forest*

The exist production forest is commonly planted with Pine tree *Pinus merkusii*, and block of Kaletes (*Eucaliptus* sp) and also a small part of Sobsi (*Strobilanthus* sp). Those productions forest are not origin species. The age of pine tree in the area is vary from seedling to ready harvested tree ( $\pm 30$  years). Mostly, this production forest is under management of PERHUTANI, but eleven blocks of pine tree forest at west side of Burangrang NR is part of nature reserve (BKSDA, 1997). Current time, the production forest has been given permit by the management to be managed by the community surrounding area. It seems among the peasants there are investors from town with big capital planting vegetables on forest land.

*c. Tea Plantation*

Tea plantation in the area are managed by state-owned company (PTPN VIII) with characteristically large area in a well-treatment, located in eastern, northern and southern side of nature reserve; and secondly by community scattered in small blocks area usually are not well-treatment, mainly in North – West side of Burangrang. *Cinchona* plantation is existed among tea plantation which is also managed by the company. In state-owned tea plantation usually was mixed with shaded-trees in purpose, such as *Strobilanthus* sp., *Chilocarpus suaveolens*, and *Erythrina* sp.. In community-owned tea plantation, the trees were clove (*Syzigium aromaticum*) and Jengjen (*Albizia* sp), and sometimes mixed with coffee.

*d. Agricultural land*

Agricultural land both in form of garden or ricefield, is commonly existed in the outside of nature reserve area. The community-owned gardens are distinguished by its planted species, included *talun* (mixed garden) that planted with hard-wood plant, such as cloves, coffees and other trees; vegetable gardens, and ricefields. Garden and ricefield area are many found at western of Mt. Burangrang NR area.

Table 4. The main habitat and habitat component in BUTAHU

Main Habitats	Habitat Components
Natural Forest	Consisted of intact forest or have little disturbance and forest that have heavy disturbance, so it tends to make secondary forest vegetation
Production Forest	Mostly are pine forest area, one block eucalyptus forest and one block <i>Strobilanthus</i> sp. forest
Tea Plantation	There are two management of tea plantation, which are company with wide area, and community with small separated blocks, mainly in North – West side of Burangrang. Block of Kina plantation is located between tea plantation.
Agricultural area	There are two main using of agricultural area, which are garden and rice field. Garden is divided into two types, which are <i>talun</i> (mix garden) that usually planted with hard plant, such as clove; and another type is vegetable garden.

### 5.1.3 Habitat utilization

The Javan Hawk-eagle has been seen in almost all types of habitat, with highest frequency in the natural forest (Table 5). The natural forest becomes an important site to build a nest, reproduction activity and hunting for prey. Other type of habitat with shrubs and high trees between offeres a hunting area. It seems that condition provides a suitable habitat for small mammals and reptiles. One tree-rat endemic species, Java-Sunda spiny rat, has been found in the floor of eucalyptus forest. The Javan Hawk-eagle hunting activity was seen in eucalyptus and pine forest. The eagle was also encountered in farmland and even flied over Kampung Rancadarah, four kilometers from the forest edges.

Table 5. Habitat utilization by Javan Hawk-eagle

Type of habitat	Utilization by Javan Hawk-eagle
Nature Forest	Breeding (nesting, copulating, breeding display), hunting and eating for prey
Production Forest	Hunting and search on prey, pearching
Tea Plantation	Hunting on prey (reported from other location of Cibulao, near Mt. Gede Pangrango, Bogor)
Farmland	Hunting location

The important trees for Javan Hawk-eagle were among others *Euginia cuprea* and *Schima walichii*. Both species were found as emergent trees among the other trees, so that playing an important role as supporting trees for nesting. *Euginia cuprea* became a nest tree at Ciasem, whereas *Schima walichii* (*Puspa*) was common and spreaded evenly, which also used as a nest tree for Javan Hawk-eagle at Cibulao, near Mt. Gede-Pangrango NP.

### 5.1.4 Habitat Disturbance

The disturbance of natural forest as Javan Hawk-eagle main habitat came from community activity in the form of logging or deforestation. The logging can be seen in many location of protected forest or in nature reserve location. The production forest and protected forest has suffered a great destruction and changed into farmland. It is also happened in nature reserve area in Cileungsing and Cijalu.

The nature reserve border in Cileungsing-Wanayasa that related directly with the farmland, has caused it suffered a lot of destruction i.e deforestation. Number of forest that has been changed into farmland reaches up four hectare each in Cileungsing and Block of Cibakom (note from BKSDA Jabar). The serious destruction suffered by forest that changed into farmland, it's become open area and remains only a few big tree. Few plantation i.e. basil, capsicum and green mustard still remained between the spread leek seedling, indicated that farming in that area has through few, at least more than two seasons. It was indicated that land has suffered great erosion by lot of mountain rock that come out to the surface of the soil, and the condition of soil that sandy tandencies without humus covering the top soil. Few source of water has

become vein of farming activity. Many of rice field run out of water in the dry season, so that many rice fields were unplanted. The rice fields that still have been watered was the one that located inclined nearby to nature reserve area.

Farming system in forest encroachment area is unfriendly to environment. In fact that many empty bottles of fungicide and remains of chemical fertilizer found in the deforestation farmland indicate the unsafe and destructed environment farming has been conducted. Remind it is located in the upper side of Cibakom River, the effect of the toxic can spread out and increase the pollution in Citarum River and Purwakarta Regency which are lower area.

According to local people, the deforestation was occur since instruction to utilize the unproductive land which was declared by the government leads by Abdurrahman Wahid (1999-2001). The citizen has utilizing unproductive land own by the National Forestry Company to fulfill their economic and fuel wood demand. But, because of there was never been watched by the forestry apparatus, the clearing bit by bit have reach into the nature reserve area and changed into a farmland. The deforested by local people, has reach broad area, and their ability can reach through remote area with declivity more than 45%.

Serious threat on nature reserve area came out from the logging. Even in the Javan Hawk-eagle active nest location, this was included on nature reserve area, often kept on logging. The logging area has come far more inside the natural forest. The tree that had been cut out was big tree, usually taken for building materials or charcoal.

Beside forest vegetation destruction, animal hunting, especially birds were often to occur inside the area. Near Panaruban Village came out information that almost everyday Junglefowl hunted by trap. By the end of the week, there has been busy by bird catchers using a glue (*leugeut*), a trap and sometime using weapon. This activity has been done in purpose by the outsider for the matter of fun or trade.

The tourism activity near the nature reserve location or the Javan Hawk-eagle habitat also came as another form of disturbance for both of it. Curug Cikondang and Curug Cijalu for example, the unfriendly environment behavior by the tourist has cost the Javan Hawk-eagle nest unactivated and the area came out as a dirty places.

The impact of this forest destruction could be seen and directly experienced by the local community such as landslide in the rain season or water shortage in the dry season. At least there were seven slides point in Cijalu deforested area. According to information from local people, the slides were only occur at recent rain season, less than a month. At least three hectares of paddy ricefield could not be harvested and suffer a great damage covered by the slide of their bananas planted deforestation precipitous slope.

On a few locations, the local community has been participating actively to decrease the disturbance by other irresponsible community by doing patrolling and guarding the forest. But the various track kept the disturbance activities was not detected.



## 5.2 Fauna

### 5.2.1 Mammalians

We record 22 species of mammals consists of 16 families, and four species are Javan endemic species. BKSDA previously reported 22 species in Burangrang and 18 in Tangkuban Perahu. Total number of both records is 26 species. The new records made by the Project Garuda are four species, including Forest Shrew (*Crocidura sp*), Grey-checked Flying Squirrel (*Hylopetes lepidus*), Java-Sunda spiny rats (*Maxomys bartelsii*) and Large Flying Fox (*Pteropus vampyrus*). Based on its by-law status, 15 species are protected under Indonesian law, one species categorized as Critical, three species as Endangered, four species as Vulnerable and three other species as Near Threatened according to IUCN. According to CITES criteria, three species include Appendix 1 and eight species include Appendix 2 (Table 6).

Table 6. Important-valued mammals found in BuTahu NRs and surrounding area

[P=Protected; Cr=Critical; En=Endangered; Vu=Vulnerable; Nt=Near thretened; 1&2 Appendix CITES; E= Java Endemic]

Scientific Name	English Name	Local Name	TP*	BR*	PG**	Status
<i>Amblonyx cinereus</i>	Oriental small-check Otter	sero	+	+	+	Nt,2
<i>Arctitis binturong</i>	Binturong	binturung	+		+	P, Vu
<i>Callosciurus notatus</i>	Plantain Squirrel	celemus		+	+	
<i>Crocidura sp</i>	Shrew	cucurut			+	
<i>Cuon alpinus</i>	Asiatic Wild Dog	ajag	+	+	+	P, Vu,2
<i>Cynocephalus variegates</i>	Flying Lemur	tando	+	+	+	P
<i>Felis bengalensis</i>	Leopard Cat	kucing hutan	+	+	+	P,En,1
<i>Herpestes javanicus</i>	Javan Mongoose	ganggarangan		+		
<i>Hylobates moloch</i>	Javan Gibbon	owa	+	+	+	P,E,Cr,1
<i>Hylopetes lepidus</i>	Grey-checked Flying Squirrel	bajing terbang			+	
<i>Hystrix javanica</i>	Javan Porcupine	landak	+	+		P
<i>Larius insignis</i>	Three stripe Ground Squirrel	tupai tanah		+		
<i>Macaca fascicularis</i>	Long-tailed Macaque	kera	+	+	+	Nt,2
<i>Manis javanica</i>	Pangolin	trenggiling		+		P,Nt,2
<i>Maxomys bartelsii</i>	Java-Sunda spiny rat	lesoq-lati Java			+	E
<i>Muntiacus muntjak</i>	Barking Deer	kijang	+	+	+	P
<i>Mydaus javanensis</i>	Javan stink badger	sigung		+	+	P
<i>Nycticebus coucang</i>	Slow Loris	malu-malu		+	+	P, Vu,2
<i>Panthera pardus</i>	Leopard	macan tutul	+	+	+	P,En,1
<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	musang	+	+	+	
<i>Presbytis comata</i>	Grizzled Leaf Monkey	surili	+	+	+	P,E,En,2
<i>Pteropus vampyrus</i>	Large Flying Fox	kalong			+	
<i>Ratufa bicolor</i>	Black Giant Squirrel	jelarang		+	+	P,2
<i>Trachypithecus auratus</i>	Silvered Leaf Monkey	lutung		+	+	P,E, Vu,2
<i>Sus scrofa</i>	Wild Boar	babi	+	+	+	
<i>Tragulid javanicus</i>	Lesser Mouse-deer	kancil	+	+	+	P
			14	21	22	

\*)= KSDA Reports; TP=Tangkuban Perahu; BR=Burangrang; \*\*)=Project Garuda 2003

Javan gibbon, Grizzled leaf monkey, Leopard and Leopard cat are the important-value species to conservation. Javan gibbon is a Javan endemic and IUCN's Critical species. The distribution area is spreaded over West Java to Central Java. During the observation only one group directly has been encountered in Ciasem, which we predict the population in the area is small.

Grizzled leaf monkey is one of the Javan endemic primates categorized as Endangered by IUCN. The species was just chosen to be the West Java Province animal mascot recently. The species is known live in primary forests and its behavior still lack known. The Leaf monkey is found mainly in Ciasem, and often seen visiting Eucalyptus forest.

Leopard is one of Endangered species. This species is known to have two basic colours variation, black and brown, with black spots on both of it. The black basic colour leopard called *Macan Kumbang* (Black Tiger) while the other called *Macan Tutul* (Spotted Tiger). Its existence in Java seems to have been replacing the Javan Tiger position as the top predator, which its existence is not well-traced until recent time. Leopard existence in this area traced by its often found footprints on the track between Panaruban-Ciasem. The black variation once has been encountered on a glance by our team at those road tracks.

Leopard cat is a smaller size cat compared to tiger. It has a great capability on climbing trees in searching for preys such as reptiles, small mammals and birds but sometimes eats leaves such as *congkok* plant (*Curculigo capitulata*) which is implied in its local name (Hoogerwerf, 1970). Its existence was detected by a glance encountered on May 2002 in the road track between *Eucalyptus* production forest and Ciasem natural forest.

The new record of mammals in this area is Java-Sunda spiny rat (*Maxomys bartelsii*). This is an endemic species to West and Central Java (known only in Mt. Slamet). This nocturnal small rat has been found in Eucalyptus production forest. It seems that many small mammals species have not yet been explored in this area, especially in mountainous natural forest which has special characteristic on its crater and vegetation. Until today, there has never been any research activity in exploring on small mammals species.

### **5.2.2 Herpetofauna**

The Observed herpetofauna were amphibian from Order of Anura (Frog and Toad) and reptilian from Order Squamata (Sub order Lacertilia and Ophidia). Total number of amphibian observed were 9 species consist on 4 families, two of them *Huia masonii* and *Nyctixalus margaritifer* are Javan endemic species. The last species mentioned existence in this area made up a new distribution record of the species. Formally it's only known from three locations of West Java's Mt. Gede-Pangrango and Situ Gunung and Central Java's Mt. Wilis (Iskandar, 1998). Number of reptilian recorded were 15 species, consist of 6 species from 4 families Lacertilia and 9 species from 4 families Ophidia. Three species *Python morulus*, *Python reticulatus* and *Naja* sp. has been recorded as protected species. Reptilian, generally, was more infrequently to be found rather than amphibian (Table 7).

Table 7. Amphibian and Reptilian found in BuTahu

[Habitat: F=Natural forest; P=Kaletes forest; S=Secondary/disturbed forest; T=Tea plantation; Location: Pr=Pancaruban; Ca=Ciasem; Pm=Pasir Menyan; Ng=Nagrok; Type of data: O=Direct observation or call/track/trace; I=information from locals; Status: \*=Endemic; \*\*=protected]

Species	Common Name	Lokal Name	Habitat	Site	Data type
<b>Amphibia</b>					
<i>Bufo asper</i>	Rough Toad	Bangkong Budug	S,T	Pr	O
<i>Bufo melanosticus</i>	Asian Toad	Bangkong Budug	S,T	Pr	O
<i>Huia masonii</i> *	Javan Torrent Frog	Kongkang Jeram	F	Ca	O
<i>Megophrys montana</i>	Horned Frog	Katak Tanduk	F,T	Ca,Pr	O
<i>Nyctixalus margaritifera</i> *	Pearly Tree Frog	Katak Pohon Mutiara	F	Ca	O
<i>Philautus leucomystax</i>	Striped Tree Frog	Katak Pohon Bergaris	P	Pr	O
<i>Rana chalconata</i>	White-Lipped Frog	Kongkang Kolam	F	Ca	O
<i>Rana erythraea</i>	Common Greenback	Kongkang Gading	T	Pr	O
<i>Xenopus laevis</i>	Clawed Toad	Katak Bercakar	F	Ca	O
<b>Reptilia</b>					
<i>Ahaetulla prasina</i>	Green Vine Snake	Ular Pucuk	F	Ca,Ng	O
<i>Bungarus candidus</i>	Malayan Krait	Ular Weling	F	Ca	I
<i>Calotes jubatus</i>	Common Green Dragon	Bunglon	F,S	Pr	O
<i>Dendrophis pictus</i>		Ular Tampar	T	Pr	O
<i>Draco volans</i>	Common Flying Dragon	Hap-hap	P	Pr	O
<i>Gehyra mutilata</i>	Four Clawed Gecko	Cicak pohon	F	Pm	O
<i>Hemidactylus frenatus</i>	Common House Gecko	Cicak Rumah	T	Pr	O
<i>Mabuya multifasciata</i>	Common Sun Skinks	Kadal	S,T	Pr	O
<i>Maticora intestinalis</i>	Red-Headed Krait	Ular Cabai	F	Ca	O
<i>Naja sp**</i>	Common Cobra	Ular Bedul	F	Ca	O
<i>Oligodon bitorquatus</i>		Ular ranting	F	Ca	O
<i>Python morulus**</i>	Asian-Rock Python	Ular Sanca Bodo	F	Pm,Ca	I
<i>Python reticulatus**</i>	Reticulated Python	Ular Sanca	F	Ng,Ca	I
<i>Takydromus sexlineatus</i>	Long Talied Grass Lizard	Orong-orong	S,T	Pr	O
<i>Trimeresurus puniceus</i>	Flat-Nosed Pit Viper	Ular Gibug	F,T	Ca,Pr	O

### 5.2.3 Avifauna

Total number of birds encountered were 104 species consist of 35 families (Appendix 3). This species number had more in quantity compare with data collected four years ago which recorded only 66 species (Setiadi et.al., 2000). The number of addition from old record are 53 species, while the present unrecorded species are 16 species. Combine with in 1998's inventories record, all number recorded in this area are 118 species.

From all of species occurs 7 Javan-Bali endemic species and 25 of them are protected species with few of them include in the CITES and IUCN list categories. Species include in CITES 2nd Appendix are *Spilornis cheela*, *Spizaetus cirrhatus* and *Loriculus pusillus*. Species in Vulnerable criteria of IUCN are *Spizaetus cirrhatus* and *Stachyris melanothorax*, while in Endangered criteria of IUCN is *Spizaetus bartelsi*.

The areal of BuTahu are important sites for diurnal bird of prey. It has been recorded 12 species of hawk-eagle and falcons, three of them are migratory bird of prey. The migratory bird of prey found in the area are *Accipiter soloensis*, *Accipiter gularis* and *Pernis ptilorinchus* (Table 8).

**Table 8. Diurnal bird of prey found in NR of Mts. BuTahu**

[Location: 1=The Peak of Burangrang; 2=Panaruban to Ciasem; 3=Base Camp & Nest; 4=Cileungsing; 5=Cijanggal; 6=Pasir Menyan]

Scientific Name	English Name	Local Name	Location
<i>Microchierax fringillarius</i>	Black-thighed Falconet	Alap-Alap Capung	5
<i>Falco mollucensis</i>	Spotted Kestrel	Alap-alap Sapi	1
<i>Falco feregrinus</i>	Feregrin falco	Alap-alap Kawah	(1998)
<i>Accipiter soloensis</i>	Chinese Goshawk	Elang Alap Cina	2
<i>Accipiter trivirgatus</i>	Crested Goshawk	Elang Alap Jambul	2
<i>Accipiter gularis</i>	Japanese Sparrowhawk	Elang Alap Nipon	2
<i>Spizaetus cirrhatus</i>	Changeable Hawk-eagle	Elang Brontok	3,4,6
<i>Spizaetus bartelsi</i>	Javan Hawk-eagle	Javan Hawk-eagle	2,3,6
<i>Ictynaetus malayensis</i>	Black Eagle	Elang Hitam	2,3,6
<i>Hieratus kienerii</i>	Rufous-bellied Eagle	Elang Perut Karat	2
<i>Spilornis cheela</i>	Crested Serpent-eagle	Elang Ular Bido	1,2,3,4,6
<i>Pernis ptylorinchus</i>	Oriental Honey Buzzard	Sikep Madu Asia	2,3

### 5.3 Javan Hawk-eagle in Butahu

From 29 observation points, the Javan Hawk-Eagle had been found in seven locations with 26 number of observation points. The location were Ciasem, Mandala and Situ Lembang (Tangkuban Perahu area) and Cileungsing, Cihanjawan, Cijalu, Nagrog-Cisair (Burangrang area). On every sites showed a predicted number of pairs that existed. As a result, Javan Hawk-eagle population in this area are seven pairs with 14 – 20 number of individual (Table 9).

**Table 9. Javan Hawk-eagle encountered data and location**

Area	Javan Hawk-eagle Location	Encountered sites	Indiv	Ages	Couples
Tangkuban Perahu	1. Ciasem	Ciasem, Pasir menyan	2	adult	1
		Jembatan Pasir Menyan	1	sub adult	-
	2. Mandala	Mandala	2	adult	1
Burangrang	3. Situ Lembang	Situ Lembang	2	adult	1
		Gunung Sunda	1	adult	-
	4. Cileungsing	Cibakom, Curug Cisalak,	2	adult	1
		Bukit Taringgul, Rancadarah			
		5. Cihanjawan	Cisalada	1	sub adult
6. Cijalu	Pondok Marjuki, Curug	2	adult	1	
	Cikondang, Cilemper, Cijalu,				
7. Nagrog-Cisair	Cisair, Bojonghonje, Sarongge	1	adult	1	

This population is slightly decreased compared with in 1998's observation results (Setiadi et.al., 2000). There was two locations from old records that resurveyed, block of Komando on Burangrang area and Sukawana (Pangheotan, Tower and Kawah Domas) on Tangkuban Perahu area, where the Javan Hawk-eagle no longer can be found.

The possibilities that explain the extinction of the species in those locations are great number of habitat destruction on both areas and or caught for a commercial needs. The block of Komando and Sukawana located at the Southern Burangrang area and included on

management area of PERHUTANI in the form of Pine production forest and protection forest. This time on both area have many changes become farmland of vegetables. This habitat changes happened determinate PERHUTANI policy to realization a Program of Forest Management together with Community (PHBM) since in the beginning 2000. This program allowed the community to plan the production forest area with vegetables plant or other annual plants.

The second possibilities are great number of the species hunting. There is no information about this bird hunting as long as observation conducted, on the other hand ever been reported the trade of Javan Hawk-eagle in Lembang, the city near that area. Other possibilities they are moving to the Northern area (Situ Lembang and Mt. Sunda).

## **5.4 Breeding**

Javan Hawk-eagle active nest has been only found in Ciasem, while the other nest in Curug Cijalu has been suffered a damage and inactive. During the surveys, it was never been found a new location of the nest, just there were big possibilities the nest take place near Curug Sabuk and Situ Lembang. Other species nests i.e. Changeable Hawk-eagle and Black Eagle have been found during the surveys.

### **5.4.1 Ciasem's Nest**

The Javan Hawk-eagle's nest in Ciasem has been known used since 1998. During 1998 to 2003, five breeding has been estimated conducted on it, it was succeeded twice and it was failed three times. The nest took place on Kitambaga tree (*Eugenia cuprea*), and first recorded was used on June, 1998. At that moment a success breeding process had been monitorized until the eaglet reached age of ten months after hatched. Six months later the nest seemed to suffer a great damage with a big hole in the middle section of it.

According to local people, in the middle of 2000 after that first known breeding, there was a couple utilized the nest at the same tree. This couple has successfully bred. The indication of this breeding success was encountered by our team as a juvenile flight over on Pasir Menyan, about 2 km from Ciasem, on April 2003. There were big possibilities that it was a following offspring of Ciasem couples since 1998.

In 2003, the nest in Ciasem seemed to be reutilized, but its place was different from the original nest. A new nest in the same tree lay about four meters from the remaining of the original nest that was still visible. On this nest the monitory of Javan Hawk-eagle breeding activity was conducted.

The location of the nest was lain on elevation of 1.100 m above the sea level, about 150 m Western side of Ciasem river. The nest was existed on one of the branch about 58 m high and 100 cm breast high diameter Kitambaga tree. The high nest was about 33 m from forest floor, while the original nest lay on the other branch with 48 m high from forest floor. With 73 cm in

width, 117 cm in length, 35 cm in thickness and 18 cm in depth from the tip of the nest. The material, started from the bottom was big branch with tight plait, then layer up with rough branches to smooth branches. There was a layer of leaf mixed with feathers in the middle section of the nest. Small size of shattered leaves were consisted of eucalyptus, *Eugenia cuprea* and *Schima walichii*, stacked and made up a soft and warm layer of the nest. On the top of the layer leaves were still on green condition and it's seemed always replaced by fresh leaves on incubating period. The Javan Hawk-eagle is known as a diligent nest cleaner bird and its nest was founded without a single faeces and or food remained on it. The egg sized was 50,55 mm in width, 59,25 – 60 mm in length, 0,383 mm in shell thickness, spherical shape, white colour with brown spotted and rough textured of the surface.

#### **5.4.2 Breeding Periode**

For over a year observation of active breeding couple in Ciasem nest, started on September 2002 until August 2003, this pair experienced three times period of breeding. (Table 10). It's first laid was recorded on September 14<sup>th</sup>, 2002. This first period was failed and ended up on October 26<sup>th</sup>, 2002 as the result of egg pecked by the Oriental Honey-buzzard. At that period the couple was rare to be seen around the nest, although on incubating phase.

After the first failed, the second opportunity of breeding came and started on April 19<sup>th</sup>, 2003. On that day one of the couple individual came back to the nest and restarted the breeding activity. Through camera surveillance the parental bird was seen incubating the egg. Odd event happened on June 1<sup>st</sup> 2003, where the parental bird was seen carrying something, suspected as an egg, outside the nest and threw it away. The remain of the shell was found around the nest tree.

After two considerable failures, on June 3<sup>rd</sup> – 4<sup>th</sup> 2003 the couple has been seen copulated around the nest. On July 1<sup>st</sup> 2003, an egg has been laid on it and hatched on August 17<sup>th</sup> 2003. The parental bird seemed to take a good care of its offspring. Unfortunately in the next couple days, Ciasem was covered with bad weather and hard rain. On August 19<sup>th</sup> 2003, at 09.23 am local time, the parental bird left the nest and never returned for the next three weeks of observation. On August 24<sup>th</sup> the nest tree was climbed and found nothing more than food remains on the nest and surrounding tree, there was no sign of the eaglet.

#### **5.4.3 The Unsuccessful Breeding Process**

In a year, the Ciasem couple of Javan Hawk-eagle had been laid an egg for three times, failed to hatch twice and the last egg was succeeded to hatch, despite its mysterious way of vanish. The gap between the first and the second laid was about six months while between the second and the third laid was only three months. Although they never returned to the nest for three weeks observation after their third failures following the vanish of their two days hatched eaglet, their bioacoustics often heard and they never really left the location.

The failure, on the hatched eaglet, was assumed its death on the nest as a result of the following two days stormy weather after hatched and the remain was removed by the parent.

On this disadvantage condition, weak condition of the hatched combined with the inability of parental bird in searching food had caused its death. Other possibility was the eaglet preyed by other predator while parental bird was out of the nest searching of food, but it was a small chance to happen despite its parental was kept on stayed in the nest covering it.

Table 10 Notes of breeding activities in Ciasem, September 2002 – August 2003

Date	Activity Notes
<b>First Breeding</b>	
09/14/02	The first notice of Javan Hawk-eagle egg on the nest, supposed since 09/07/02.
09/20/02	Intensive observation was started by team and trying to keep off disturbance against Javan Hawk-eagle. An egg was seen in the nest.
Sept 02	A few nest monitoring had been conducted along September, yet it's never been seen inside the nest, only its bioacoustics heard and flight over the nest. Monitoring was reduced its frequencies.
10/20-21/02	Monitoring was conducted; It's seen flight over the nest and never stopped on the nest for incubating.
10/26/02	An individu of Oriental Honey-buzzard ( <i>Pernis ptilorhynchos</i> ) was inside the nest and pecked the egg.
11/05/02	The nest tree was climbed by team, there was cracked putrefied egg found inside the nest.
<b>Second Breeding</b>	
Dec-02 – Mar 03	Routine monitoring was conducted every month. The couple still could be seen on that location.
04/19/03	Javan Hawk-eagle was seen incubated an egg (through camera surveillance)
06/01/03	A Javan Hawk-eagle was seen carrying out something outside the nest, it's supposed the egg, and the remain of egg shell was found under the nest tree.
06/02/03	Javan Hawk-eagle still could be seen flight over nest location
<b>Third Breeding</b>	
06/03-04/04	Javan Hawk-eagle couple was seen copulated around the nest.
07/01/03	An egg inside the nest was noticed.
08/17/03	Egg was managed to hatch, parental bird seemed to protect and take good care its hatched eaglet.
08/18/03	Stormy rain all day long, team was unable to monitor the nest.
08/19/03	At 09.23 am local time, parental bird left the nest, eaglet was unable to see inside the nest.
08/20-23/03	Camera surveillance was kept on to conduct with manual monitoring occasionally, parental bird never returned to the nest (up to three weeks observation).
08/24/03	Team managed to climb and check the abandon eaglet and found nothing inside the nest except remains of food. The couple never returned to the nest, only their bioacoustic still heard not far from nest. After three weeks, the Javan Hawk-eagle never returned to the nest, then team decided to take apart all equipments and left the location.

#### 5.4.4 Incubating Behaviour

On the third breeding process, it's still noted incubating behaviour of Javan Hawk-eagle parental in the nest. From direct observation and through camera surveillance, it's noted eight incubating behaviours, which are: a) nest tidying [removing stick position with its bill]; b) incubating [including incubating position change]; c) standing up; d) preening; e) turn around; f) plucking the feather; g) flown; h) bill cleaning to branch; i) urination and defecation; and j) calling. From overall of daily activity, dominantly, activity was conducted on incubating

period were incubating and cleaning feather. The parent was releasing call for its couple when incubating on estimated that voice for the commutation of incubation. Incubating activity seemed not to be interfered by small birds activities in the morning and afternoon around the nest. The parental bird only watched carefully to those birds.

From the third observation, incubating periode duration was predicted 48 days, because incubation behaviour was started on July 1<sup>st</sup> 2003 and the eaglet was observed on August 17<sup>th</sup> 2003. On the first two periodes its incubating activities was not seen as a clear activity and all eggs failed to hatch after laid in the nest. Both parents were involved in the incubating process although the female was more dominant portion of it. When one of them on incubating position, the other position was not too far from the nest to watch out surroundings. The uncertained incubating exchange process could take time in the morning, mid or afternoon, even male often was not seen at all in a few day and the nest was left unprotected.

The parental often left the nest early in the morning, from dawn till 08.00 or 09.00 AM. The off-nest activities had a big possibility to fulfill its demand of food. It's observed for many times to rub its beak repeatedly on the branch, seemed after do meal activity. They both never brought the food inside the nest to keep away from other predator interest.

#### **5.4.5 Awareness**

The research activity of the Javan Hawk-eagle's nesting behavior through the camera surveillance had indirect impact on its conservation awareness. Many community has been involved since the first process of the research, especially on camera installation and camera surveillance observation. In all entire of process in the nest, almost 100 people involved with various backgrounds such as local youth community, local village agencies, tea plantation local staff, college students and lecturer from Padjadjaran University Bandung, Birdwatchers Club (BICONS), NGOs (PILI and Telapak), outdoors club (PGPI), rock climbing club (Skyger) and other communities outside Panaruban area (from Mt. Simpang and Bandung city).

Indirectly, the camera installation activity in the nest has caused curiosity for many parties. They got involved for many reasons, and few thing could be noticed i.e. their curiosity to see the Javan Hawk-eagle on its habitat. On the other hand camera surveillance in research purpose seemed to be a new phenomenon for most of them. Other thing that drew out attentions were the installation and waterwheel operation. From all of that, there was a quite important impact rised their concious on the environment and there was an activity need to conduct the environmental conservation.

The attention paid by the communities for activity conducted by Garuda team had been an indirectly material of promotion and awereness the conservation effort of Javan Hawk-eagle and its habitat. This promotion was a starting point to conserve whole Mt. Burangrang and Tangkuban Perahu.



## Part C

# CONSERVATION ACTION

## 6 ENVIRONMENTAL EDUCATION

Environmental Education (EE) is one of campaign tools in overspreading environmental issue and information to community, especially to student through informal and formal education institute. This Environmental Education emerges because the information about environment not socialized enough either in school or also in community, either through direct counseling or through mass media. With this environmental education, it is expected the community not only increase their knowledge, but also it can improve; repair their behavior and learn to solve existing problems, especially environmental problems.

On this opportunity, environmental education activity was given to elementary school student. The selecting of school age child, especially elementary school student, because children represent the youth of nation who will legacy this nature in the future. Pursuant to research result, children especially age 0 to 5 years, the acceptance of something is easy to be permeated and remembered, so that knowledge, especially through experience which they get do not easy to forgotten. Elementary school students were selected with consideration as age closest to 0 to 5 years and not influenced yet by the opinion from outside and also have owned the independence. We believe that the children can influence the conservation behavior of their parents.

### 6.1 Preparation

#### A School Selection

Location of elementary school was selected through pre-survey in three regions, which are Bandung, Subang and Purwakarta. The survey conducted either in rural and also in urban area. School criteria in rural is that the school close to forest and easy to access, vehicle reachable in this case. Besides those considerations, the target school willing to accept the Environmental Education program that offered. After taken four surveys, the chosen School was Sangkuriang Elementary School (SDN Sangkuriang) in Panaruban-Subang to represent elementary school residing in rural environment. For the school that representing urban environment was Hikmah Teladan Elementary School (SDHT) in Cimahi-Bandung.

#### B Permission

Permission, which is needed to conduct this activity, is just from pertinent school after passing socialization process and offering material activity that will be conducted at that school. Permission for the Sangkuriang Elementary School is relatively easy because the school had

already got the Environmental Education activity in 1998-1999. Environmental Education activity in Sangkuriang Elementary School was executed on Saturday start from 07.00-11.00 WIB, once every two weeks. Difference with the Hikmah Teladan Elementary School, to conduct the Environmental Education activity, school manager needed demonstration activity. Therefore, we conducted a pilot activity to proof the serious willingness of PG team by bringing entire students of Hikmah Teladan Elementary School to Cikole Camping Ground. Finally the school impressed and gave the one hour lesson on Monday and Tuesday every week.

### **C Making of EE ToR**

This ToR making was conducted to comprehend the target and easiest way to understand the activity and also as guidance of activity offered to the chosen school. The items of the ToR that we offered to each school were a little different, adapted to the school condition.

## **6.2 Environmental Education Module**

Before the activity of Environmental Education was started, Environmental Education module was made to draw up the items and instruction for the children of the school. The aims of Environmental Education activity for the elementary school are: 1) to increase student awareness of their environment; 2) to distribute the environmental and biodiversity information; and 3) to increase student comprehensive about environment.

### **A Making and Compilation of EE Materials**

Environmental Education materials was basically applied equal in both two schools, and this materials became expanding from that was preparing before, adapted to place and time, which have been provided by each school. There were three main materials to be studied, which were Forest (plant), Javan Hawk-eagle (fauna) and water.

### **B Questionnaire Making**

The questionnaire was made according to the studied materials and made as simple as possible. The questionnaire was made double to be given to each student; before and after activity each visit to compare the level of student understanding about the materials. This questionnaire was also utilized as evaluation material of fitness of method giving. The others material evaluations were seen from appearance and spontaneous answer of students.

### **C Making of Material display**

This Environmental Education activity is different from ordinary school activity that usually conducted at school. It is needed more tools and material display to support the student learning process. Material display is very needed to support the forwarding materials, simulation, direct activity and discussion in nature/field. To support the game activity, we

used puzzle, game of doorstep snake, headband, crossword, pictorial paper of animal, reuse material, and various other materials. For the activity of simulation was needed picture, miniature of hill and appliance role-play. For the activity in the field, it was prepared binoculars, bird field-guide and stationery.

### **6.3 Environmental Education Approach**

#### **A Approach of Environmental Education Forwarding**

In general there were two approaches of Environmental Education forwarding, there were activities in and outside class. In class was submitted by simulation and discussion with the simple activity and easy to be applied, to open the student wider preception and also push them to do the routine conservation activity on their own life. In practice, these approaches were adapted depend on each school condition. In Sangkuriang Elementary School, Environmental Education activity was not the school curriculum, so that the Environmental Education was done interactively with the introductory gift of items inside the class, continued with the game, interactive dialogued and quiz, and then conducted excursion field. While in Hikmah Teladan Elementary School, Environmental Education activity was adapted to the school curriculum by giving the theory and game inside and outside class.

#### **B Amount of Student**

About 167 students from two schools followed the activity of Environmental Education, consisted of 52 students from Sangkuriang Elementary School and 115 students from Hikmah Teladan Elementary School. In Sangkuriang Elementary School, students whose followed Environmental Education were consisted of third until six grade, while in Hikmah Teladan Elementary School were consisted of second until four grade students.

### **6.4 Implementation**

#### **A Activity in Sangkuriang Elementary School**

The activity of Environmental Education in Sangkuriang Elementary School was carried out in two phases. First phase was conducted on September until November 2002 in 3 times meeting, second phase was conducted 6 times on February until April 2003. Besides routine activity, it's also conducted a combined activity by the end of a school period at 5-6 July 2003. The Environmental Education theme given to Sangkuriang were about forest, Javan Hawk-eagle and water, according to the environmental condition in school which they see everyday (App 04a)

## **B Activity in Hikmah Teladan Elementary School**

Environmental Education Activity in Hikmah Teladan Elementary School was started with introducing the activity to student and its teachers. This activity was conducted by inviting the entire students and teachers to the Cikole Camping Ground to do field activity on September 21<sup>st</sup>, 2002. About 180 students and ten teachers followed this activity. After the activity at Cikole Camping Ground, the first phase of routine Environmental Education was started on October until November 2002 with three times meeting, which was given to the third grade only one hour every week (App. 04b). The second phase was started on February until June 2003, which was given to the second until fifth grade in four times meeting every week in rolling system. Besides the routine activities, it was also conducted an exhibition at school about the activity of Environmental Education. And it's also conducted merger activity between the students from Hikmah Teladan and Sangkuriang Elementary School by the end of school year.

## **C The Activity with Hikmah Teladan and Sangkuriang Elementary Schools**

To understand and recognize more about the environment, by the end of second phase of Environmental Education, on 5-6 July 2003, it was conducted an environmental Smiling Camp for two days in Panaruban-Subang for both schools. This activity was aimed to give an experience about nature, to make the two schools know each other and also to straighten out their independency.

## **6.5 Learning Lesson**

There were characteristic differences between the school in rural and urban area. These differences have made an approach adjustment and interpretation technique of Environmental Education to students of Sangkuriang Elementary School, because of their shy characters, the difficulties to express their ideas, and also they much use local language, Sundanese. They were more malleable so could be easier to control. Thereby, tutors should give more details and active when interpreting the themes. To dig more the understanding of students, approaching in small group was more majored. Differ from the Hikmah Teladan Elementary School, which the students characteristic were very aggressive, more able to express their mind and hard to control. Tutors were claimed to work harder and had wider enough knowledge and also more creative. The Approach technique in small group was more majored to keep the concentration more focus.

The Benefits for students through this Environmental Education were: 1) Student got extra knowledge about environmental and nature ethics; 2) Students got wider perspective and to them who had shy characteristic could be more creative, braver to express their opinion and improve their self confidence; 3) Student got the experience work with each other and socialized with students from another schools. From the entire themes and activities that we were given, in general both school students more interested and delight to the out door and

games activities. It was obvious if we observed the result of presentation and discussion of all students in each activities session. The out door activities in the form of game were better and quick to understand.

Pursuant to the things above and tutors perception, the students interesting in followed the Environmental Education activities were because of: 1) Schools interfere, in this case the teachers, which was by *forcing* students to follow the Environmental Education activities. But according to tutors perception, this interfere action had been only happened at the first period of Environmental Education activities, because the students was not interested yet and they had no idea about what activities they would conduct. After they followed the Environmental Education activities several times, students no longer had to be forced, on the other hand the students made us to keep the activities on going; 2) the activities model, which are game, simulation, presentation and interactive situation. More detail it can be seen at activity impact and; 3) themes; they were interested because of the materials were given to the teachers and schools management, which showed the importance of Environmental Education for the children.

## **6.6 Activity Impact**

Generally, big impact of this Environmental Education has not been seen directly yet. Tutors, parents and teachers just perceived the existence of students point of view and behavior changes to environment and its problem, which were:

- According to Teachers of Hikmah Teladan Elementary School, there were changes on the way of child passed on the littered forbidden to school pond. Previous the children only said “no littered ok!”. Now lots of them were more voicing the sentence " Don't defile the pond, think about the fish, ok!". According to the teacher, the children answered more sensitively and touched the emotion and there were defense to the other living creature. This children attitude made the teachers happy.
- At the plant diversity theme in Hikmah Teladan Elementary School, where one of the student's duties was collected various type of leaf. Tutors reminded to took only one leaf of every plant. Some children in one of the group were going to took the leaf by plucking its branch, so that will be lots of leaf plucked, and one of the group member warned they did not to it by mentioned the reason: " the tree will have a pain...."
- Game of Javan Hawk-eagle representing one of Environmental Education activities in the reality had become their daily game, even a favorite game, so that they always remember and often talk about food chain, with the Javan Hawk-eagle as the main character; about the Javan Hawk-eagle as top predator (the king-as their version), about the hunter and logger who destruct their *chain food story* (from activities in Hikmah Teladan Elementary School)

- Some students of Hikmah Teladan Elementary School, which were met the tutors at the non-class of Environmental Education time, sometimes angry and sulk because their class seldom to be visited.
- Some students would do anything as long the Environmental Education kept on continuous or that the tutors wouldn't go, started with ordering their friend to keep quiet during the activities, even some of them always followed the tutors everywhere they went.
- At the water theme, which the activity form was game, there was one student of Sangkuriang Elementary School, which was because of his desire to assist very big, he made the line (for the game) on the football field using **ruler** and **chalk**. The answer he said when one of the tutor asked him were: " so that the lines were accurate" (in Sundanese). For tutors who followed the activity at that moment, the view was very heart-warming.
- One time, there were some students which were the inclusive naughty group of the students at Sangkuriang Elementary School, didn't follow the activity (tutors did not force them to follow the activities) but after they had seen the games and how their friends were very enjoying the activities, one by one started to follow the activities, although there was one student which remained not to follow the activities.
- Their caring appeared to hunting activity with prohibited the adults from their village who become the hunter for no longer hunting the small bird, although it's failed and the hunters were angry.
- At adults the merger activities between Sangkuriang and Hikmah Teladan Elementary School, looked that there were knowledge sharing, which were some of Sangkuriang Elementary School students who had more knowledge about the plant and bird diversity in the Smiling Camp location shared their knowledge to the Hikmah Teladan Elementary School students, whose only knew it from the lecture in class or by the pictures. So the Sangkuriangs Students acted as they were guides for the other students
- At the school exhibition in Hikmah Teladan Elementary School, NaturLike Environmental Education spreaded the questionners to the parents, not all of the questionnaire were returned, but from the returned questionnaire had been seen that they gave positive response to Environmental Education. And from the question are about 'did their child get any environmental behavior changes?' some of their answers were:
  - Their children were seen more active and dare to express their opinion and wants
  - There were any changes, but not much
  - Their children self-confidence increased and got more guts to express their opinionOther answers mentioned that there were positive changes happened but they did not mention it on details.

- From the teachers story, they mentioned that there were positive changes on the children environmental behavior, so they intended to continue the Environmental Education Activity.

## **6.7 Capacity Building**

In order to improve the capacity and ability, the tutors of Project Garuda - Environmental Education followed some training activities and study comparative to support Project Garuda Environmental Education, there were:

- Attended the Indonesian Environmental Education Network meeting in Kampong Pending, Bogor at 20 - 21 October 2002. This meeting was containing training, discussion and information sharing between the member about various activities on awareness.
- Attended the Environmental Education comparative study and ecotourism try out in Gede Pangrango National Park, which was carried out by KePAK at 20-23 December 2002. This activity gave extra knowledge and input concerning preparation of Environmental Education activity, example of the Environmental Education training to the school teachers and the forming of environmental club.
- Attended the Environmental Education training, which was carried out by YPBB (Bioscience and Biotechnology Foundation) at 9-10 August 2003. From the activity we got extra knowledge and input concerning the Environmental Education process and environmental education meaning itself, and also the interpreter form and technique that was selected according to each age of Environmental Education students.

## **6.8 Follow up**

- The Project Garuda Environmental Education module had been made to provide the reference for Environmental Education learning process. The book will be distributed to school that have Environmental Education enthusiasm, so it's hopefully the Environmental Education will be sustained.
- The Project Garuda -Environmental Education team had formed a new forum to provide all Environmental Education activities, especially for the school students. The forum called NaturLikE, which abbreviation of Naturalist Cilik berEtika (Kids Ethical Naturalist). NaturLikE have vision to implant totally environmental ethics understanding through environment education to Elementary School students.

## 7 RADIO BROADCASTING PROGRAM

Community knowledge about the important of forest area and environmental conservation are still felt very less; therefore, the broader reach awareness effort is very needed. Role and responsibility of mass media become required in realizing community support in environmental conservation. Radio as a form of electronic media assesseds effective enough to submit the information about environmental conservation because its wide reach.

Considering the important role of Radio in overspreading environmental information, hence PG Team made a good cooperation with organizer of some radio as a support in the environmental conservation effort.

To give the environmental awareness to community, the information had to be given continuously. Therefore, a broadcast package on environmental information was made to be broadcasted every week through radio, so that community could observe continuously the environmental information attentively.

### 7.1 Preparation

#### *Training*

Work a closer cooperative out with the media early was performed by environmental news coverage training. This activity facilitated team requirement in handle the environmental issue dissemination and how to inform it to wide society around Bandung through media, especially radio.

This training had theme "The Role of Media in Environmental Conservation around Bandung" was held for two days, on June 8-9, 2002 in Wisma Taruna, Bandung. This training was followed by 21 participants; 13 people from PG team, 3 people from Universities (UNPAD, IPB) and 5 people from NGOs. The activity in this training was in the form of material, discussion and simulation. The material was about making an environmental program on radio and printed media, and also brief introduction about media characteristic. This item was given by four keynote speakers from RRI (Republic of Indonesia Radio), Radio Mara, Performa Optima and Pikiran Rakyat Newspaper.

The results obtained in this training were 1) established a team on handling environment news and issue around Bandung and Garuda Team activity on preserve the Javan Hawk-eagle and its habitat effort in Mount Burangrang and Tangkuban Perahu area; 2) made a good relation and cooperation with media, especially with the radio, so that Garuda team at least knew the bureaucracy line which had to be gone through if they were going to inform the environmental news on radio.

For further knowledge how an institute could farther be involved with media, then three people of PG team followed the Workshop of Effective Advocacy of Civil Society Organizational through Media on September 5 – 7, 2002 in Hotel Mitra Bandung, which was carried out by



Bandung Institute of Governance Studies (BIGS). This Workshop contained the brief training about printed media, radio and television, where each participant was presented the institute activity.

#### *Radio Selection*

To broadcast and overspreading the information about environmental issues around Bandung and activities that had been conducted in Project Garuda, PG team contacted two radio in Bandung, which were RRI (Republic of Indonesia Radio) of West Java regional and Rase FM Radio (private). Finally, team selected RRI based on several conditions, which were: a) reach area of RRI listener was very wide, mainly it could reach Bandung, Subang and Purwakarta Regencies. Those regencies administratively covered observation area of Project Garuda, Mt. Burangrang and Tangkuban Perahu; b) the *airtime* cost was relatively reached; c) there were compatibility perception between PG and RRI in the case of caring to environment around Bandung; d) RRI represented the state radio which notabene represented the governmental propaganda appliance to socialize the governmental programs to community, so with the existence of environmental broadcasting by Garuda team, people knew the governmental involvement in handling environmental problems about Bandung. While Rase Radio remained to keep relation with PG team as speaker for environment program produced by radio itself.

## **7.2 Broadcast Activity**

Awareness program through RRI Bandung had theme “Role of Radio on Environmental Conservation around Bandung”. Broadcasting execution took place since November 2002 until January 2003. This activity goals were 1) Giving base information to community about various aspect the importance of environmental conservation in Bandung and its surround; 2) Giving information about forest condition that existed around Bandung as habitat of Javan Hawk-eagle and water catchment area; and 3) Developing and improving Bandung community awareness and caring to environmental conservation.

The results expected from this activity were spreading the information about existence of the threatened Javan Hawk-eagle in its natural habitat and the forest condition that existed around Bandung as habitat of Javan Hawk-eagle, water catchment area and rising of response and community awareness to the importance of Javan Hawk-eagle and its habitat conservation

The method used in this broadcasting was in form of interactive dialogue between announcer and speaker about the issue (each broadcast) and interactive dialogue between listener and speaker through question and comment. The existence of response from radio listener trough question or comment by phone became the indicator level of the community aspiration to environmental issues

#### *Broadcast material*

Generally, the broadcast materials were as follows (also seen in Table 11):

- a. *Save the Garuda from Extinction*; There items were contained the explanation about condition of Javan Hawk-eagle status, its existence and also condition of habitat destruction becoming threat for Javan Hawk-eagle. Also explained effort how to preserve the Javan Hawk-eagle.
- b. *The Environmental Condition surrounding Bandung Area and Its Problems*; Broadcast material were contained about environmental problems and condition generally in Bandung City, among other things, environmental strategic issues were forest damage, popullation density, water issues and garbage. The differences between past and present of Bandung condition tended to get the quality degradation live.
- c. *The Existence of City Forest in West Java* ; This material explained about city forest definition, function and its existence in West Java.
- d. *Forest Hydrology Function and Water Condition in Bandung*; The material was about water issues and water supply in Bandung City and how to preserve the water source to keep exist.
- e. *Project Garuda Team Profile*; Contained about Project Garuda team profile, reason and background establishment this team. The goal was to preserve BUTAHU area through research combined with continous awareness..
- f. *Forest Perspective among Many Parties*; Described about the extraordinary natural richness and many parties that felt right to exploite and manage the forest. Beside that it's also explained about several forest functions, such as a esthetic, ecology and hydrology function.
- g. *The Wildlife Hunting and Trade : The Threat of Wildlife Conservation in Nature*; This material explained about wildlife existence in nature that was very concerned and more threatened. Explained also the human behaviour that could maxe rapid extinction such as animal hunting and trading; because of that, it needed eliminate efforts and fighting against it, such as through law enforcement.
- h. *The Environmental Conservation effort through The Environmental Education*; Broadcast materials explained about one of efforts to increase community awareness with extension to wide community and environmental education for elementary school children.
- i. *The City Park Role on Environmental Conservation*; Broadcast materials were loaded about role of city park environmental conservation in the city, because city park had own ecological and hydrology function beside a esthetic, recreation and conservation functions. It's also explained profile about BICONS, which its activities lot of conducted in Bandung city parks.
- j. *Community Based Forest Management*; Materials submitted was definition of community based forest management, its benefit and produce that gained and also the issues that faced in manage the forest.

Table 11. Broadcast matrix and response number from listener

Date	Location	Broadcast Material	Speakers	Callers *
18 Nov 2002 15.00-16.00	Pro 1 FM Corong Kita	Save the Garuda from the Extinction	Zaini Rahman & Ridwan Noviana	5
27 Nov 2002 10.00-11.00	Pro 3 FM Interaktif 60	The Environmental Condition Surrounding Bandung Area and Its Problems	Rohadjie Tri & Dadan Ramdhan	2
02 Dec 2002 10.00-11.00	Pro 3 FM Interaktif 60	The Existence of City Forest in West Java	Pupung F. Nurwatha & Asep Rahmat Sudrajat, Aryan	4
11 Dec 2002 10.00-11.00	Pro 3 FM Interaktif 60	Forest Hydrology Function and Water Condition in Bandung	Pupung F. Nurwatha	1
16 Des 2002 16.00-17.00	Pro 3 FM Detak Pasundan	Garuda Team Profile	Detrizki, Ade Rahmat, Pungki Lupiyaningdyah	No discussion session
23 Dec 2002 10.00-11.00	Pro 3 FM Interaktif 60	Forest Perspective among Many Parties	Wahyu Rahardjaningtrah & Ade Rahmat	2
26 Des 2002 15.00-16.00	Pro 1 FM Corong Kita	The Wildlife Hunting and Trade: The Threat of Wildlife Conservation in Nature	Budi Harto, Pupung F Nurwatha, Ade Rahmat	4
31 Dec 2002 15.00-16.00	Pro 1 FM Corong Kita	The Environmental Conservation Effort through The Environmental Education	Fitriya, Pungki Lupiyaningdyah	7
07 Jan 2003 19.30-22.00	Pro 3 FM Aspirasi Parahyangan	The City Park Role Conservation	Ahmad Hadian, Lidya Ariesusanti	4
17-20 Jan 2003 15.00-16.00	Pro 1 FM Corong Kita	Community Based Forest Management	Ridwan Soleh & Nurdiana	6

\* (Suggest, comment, question from listeners)

### A Material Conveying

Broadcast materials were made to be compiled in a broadcast module, which its contents besides about animal and habitat conservation, also included local issues or problems that often happened around community. It was seen from the broadcast result got each session, from material that was given, obviously got the good response from community and the information accepted clearly by listeners. This could be seen from broadcaster questions which enough knew the issues and from enthusiastic callers whom ask and comment about several environmental issues; therefore, this broadcast module that was given were appropriate with the targets.

From the broadcasting process; generally, the broadcaster could direct the questions based on the modul. Therefore, it's easier the speaker to explain further about the material that would be conveyed to listener. The broadcaster had knowledge about discussed material, it's seen from the number of questions which asked to the speaker not merely coming from module but also pursuant to broadcaster knowledge about environmental issues that happened. Commonly, broadcaster could ask about 15 - 20 questions per hour (Figure 3).

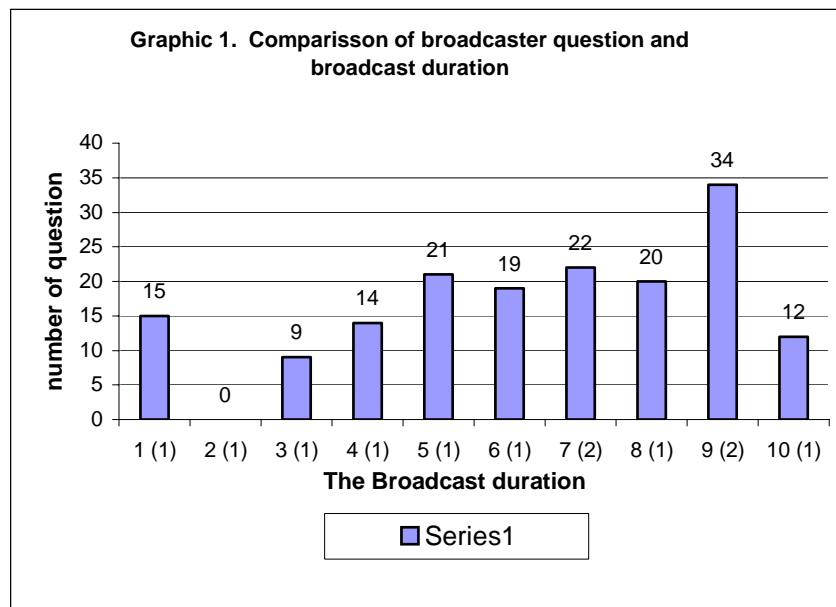


Figure 3. Graphic of number of broadcaster question and broadcast duration

The broadcast material was packaged in the form of interactive dialogue among broadcaster, speaker and caller. Interactive dialogue was good, mainly to observe direct participation from community and it could be discussed and also solved the problem of discussion material, so that the problem solution was obtainable the picture at that time. The keynote speakers who filled this program mostly were come from members of Project Garuda Team, from NGOs (YPAL, PPSC and DPKLTS), Birdwatcher Club (BICONS), Environment observers, Regional Government (Bandung Regency) and students.

**B Effectively of Broadcast Time**

Broadcast hour at noon was the most effective time to submit the materials compared to in the morning or evening time. This matter could be seen from number of response calls in the morning only two callers from three times broadcast, in the evening about five callers from twice broadcast, whereas in the afternoon there was six callers in four times broadcast (see Figure 4). Probably, in the afternoon most of people just completed their activities, so that for certainty they were taking a rest. While in the morning, listener in pursuance of outdoor activity (working) and in the evening, the listeners wee tired so that on the time interval they possibility used to take a rest and spent the hour with their family.

Besides the regular package of broadcast, RRI Bandung and Rase Radio also invited Team PG several times as speaker on their own radio broadcast program. RRI Bandung was invited PG team to become a speaker on two broadcast session, which were about the existence of bird species in Bandung and natural forest condition in West Java. Radio Rase was invited PG team to become a speaker on topic of existence and function of city park related to natural environment near Bandung City. Interview through telephone was conducted by Mara Radio about golf course development issues in Panaruban around Tangkuban Perahu area.

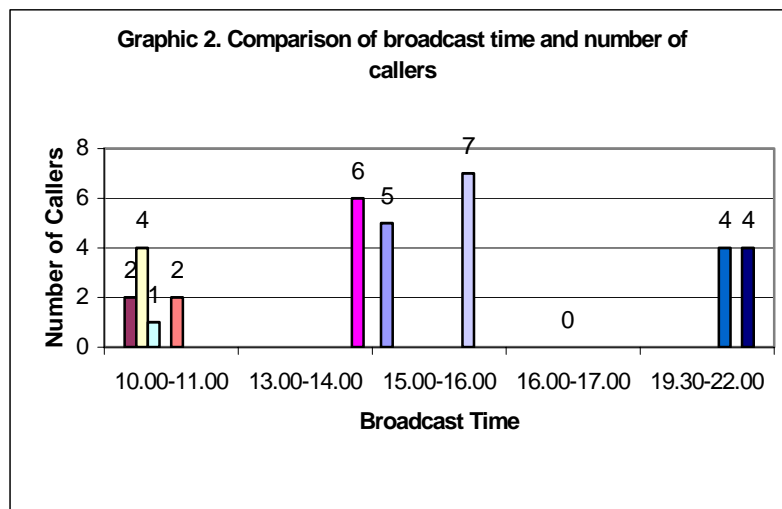


Figure 4. Graphic of broadcast time and number of callers

**C Listener Response**

From all of broadcasting activity series in RRI Bandung, there were 35 callers that responded to this environment topic submitted by PG team. From all callers, more than half (21 callers) were contained questions, comments and suggestions and also critics related to discussed topic.

Mostly all caller was parent even old age which lived in the town boundary. However, they quite understood and concerned about the environmental problems either forest or town, it could be seen from their positive suggestion and response. Generally, the caller asked emphasize at the environmental problems exist around their residence. Environmental problem of Bandung, such as river contamination, factory waste, reforestation, implementation of environment policy and its control, became discussion substance that often emerged on air discussion with listeners.

**7.3 Radio Recommendation**

- To get the more varying listeners for example adolescent and kids, it’s suggested to conduct broadcast in Radio Station which its listener covered the age level.
- Require to be performed a quiz to draw the listener enthusiasm; despitefully, it can be made a success indicator from submitted material.
- Need follow-up from radio broadcast program, such as excursion activity from submitted material (for example bird watching in city park), this matter is felt needed, so the listener get the more circumstantial impression about the environmental conservation.

## 8 EXHIBITION AND DIALOGUE

Exhibition and dialogue are others form of activity that was conducted by PG team to increase community awareness about the important of animal conservation, especially the Javan Hawk-eagle and its habitat. No spesific exhibition that was held by PG team or with the spesific theme about the Javan Hawk-eagle. Mostly, PG team was invited to fill exhibition stand about environment that was held by other institutions such as University, regional government or others NGOs.

Besides following various environment exhibitions in West Java, PG Team was also conducted the presentation and dialogue with government and conducted the discussion with the community around forest area. To support the good communications process in presentation and dialogue or meeting with the community, PG Team made the sticker related to Javan Hawk-eagle and clean water source saving.

### 8.1 Exhibition Activity

- The first exhibition was held by Birdwatcher club of Islam University of As-Syafi'iyah Jakarta on June 17-18, 2002 in order to celebrate World Water Day. Mostly visitors came from college students, the rest was NGO and community. In this exhibition, we introduced the institution activities mostly about Project Garuda. Beside spreading leaflet and other materials, we also promoted this activity to visitors to participate as volunteer.
- The second exhibition in the form of stand presentation in Bandung that was held by Environment Technique Study of Bandung Technology Institute on February 24-25, 2003 about environmental caring, where this exhibition was followed by NGO, university and commpany that have concern to environment. Mostly, the visitors came from college students, students and community.
- The third exhibition was held by YPBB (*Yayasan Pengembangan Bioscience dan Biotechnology*) in Cilaki Park of Bandung on April 20, 2003 in order to celebrate Earth Day. This activity was followed by NGO's around Bandung and few from Jakarta. The visitors came from wide community.
- The fourth exhibition was held by University of Education Indonesia on April 21-22, 2003 in order to celebrate Earth Day. This activity followed by several NGOs with the majority visitors came from college students. Beside spreading materials and selling some Project Garuda products, mainly to drawing volunteers to join Project Garuda activity.
- The last exhibition, team participated in Environmental Education Exhibition for Elementary School that was held by Environmental Regional Development West Java Province Bureau in Subang City on July 24-25, 2003. This exhibition followed by several NGOs and Regional Environmental Bureau of whole West Java, with the theme "Journey from Mountain to the Sea". This activity specialized for Elementary School Children in Subang and part of Bandung, and it was attended by 2200 students.

## **8.2 Presentation & dialogue**

- The first presentation followed by PG team was on seminar and workshop of Biodiversity in West Java, through oral and poster presentation with the theme presentation “The Existence Forest of West Java through Study of Javan Hawk-eagle Population” on August 1, 2002 that was held by Biology of Bandung Technology Institute. This seminar was attended by environmentalists, civitas academics, related government agencies, NGOs and communities.
- The second presentation of Project Garuda presented in a workshop about “The Role of Media in Environmental Conservation in Bandung” on October 26, 2002. This talk show was attended by mass media, College Press, Government Agencies, NGOs and Academics. The talk show itself presented some keynote speaker, which are I Nyoman Nuarta (a famous sculpture artist), Drs. Sapaat Saniatmadja (Broadcaster of RRI Bandung), Drs. Hilmi Salim, MSc. (Lecture of Ecology Institution of UNPAD), M. Ridho Eisy (PR of Pikiran Rakyat Media) and Asep Rahmat (DPKLTS-NGO) with the moderator from Lecture of FIKOM UNPAD (Tri Irwanda).
- The third presentation was conducted in government agency of Environmental Regional Development West Java Province Bureau (BPLHD) on Mei 21, 2003. This activity was conducted in order to obtain support from Government of West Java Province .
- The last presentation was in “Ekspose of Area Management of Natural Reserve/ Recreational Park of Mount Tangkuban Perahu” event on September 30, 2003. This expose was held by Section of Region Conservation I of West Java . This expose was attended by Head of BKSDA West Java I, representative of Forestry Agency and Tea Plantation of Subang Regency, representative from 3 Subdistrict around Tangkuban Perahu, 3 Chiefs of Conservation Region Section, 7 Village Chiefs around Mt. Tangkuban Perahu, 6 Chief of Conservation Region Task Force, Head of Tea Plantation of Nusantara VIII Ciater, Perhutani (Indonesian Forestry Company), NGO and Scientist.

## **8.3 Community Meeting**

- First meeting with community of Kampung Panaruban, Subang especially with youth people club (Karang Taruna) on June 26, 2003 to inform Project Garuda (PG) activity. The meeting was attended by the older, community figure, religius figure, village apparatus, representative of tea plantation and youth people club. The result meeting was revealed a highly interest from Panaruban community to join actively in nature conservation activity. Through the chief of Karang Taruna was particullary ready to help PG activity especially in establish camera surveillance with become a porter, base camp guard and gave information about the eagle existence. Karang Taruna was also ready to help PG environmental education activity that was held after the meeting. Its also revealed that the community will help PG team to “preserve the forest” around Panaruban. The community response to the team was very high, especially on related issue of water around

the area that was became hot topic in the community. The community and the young man oftenly invited PG team in community meeting disscused water and forest issues around the area. Research team of PG also helped a photograph session in Karang Taruna secretariat for 94 people to make Member Card of Panaruban Youth.

- The second meeting with member of Karang Taruna Panaruban was on September 12, 2003. This meeting was attended by chief of Karang Taruna and some representatives and proxy and local chief (RT). Due to the desire of PG team to build farther relation with the local society, hence at that meeting PG Team brought along Mr. Ridwan Soleh (YPAL) and Mr. Turki (Citizen Mt. Simpang) as facilitator to open the discourse about activity of community and team in the conservation effort of the area.

#### **8.4 Awareness Material**

The awareness material was made to support awareness activity to wide society. The concept of making this material was based on tree main issues that had been brought in this project, that was Javan Hawk-eagle, Forest and Water (Table 12). This material basically was disseminated free, either as grant or as present. This Awareness material was spread through exhibition activity in Bandung, Subang and Jakarta, schools in Bandung and Subang City, presentation in seminar and institution, direct spreading to people around Bandung, Subang and Cianjur, and deposited it to some institute in Bandung City, Bogor, Jakarta, Cianjur, Bali and Padang.

Table 12. The material that was made in support this project are:

<b>Material</b>	<b>Unit</b>	<b>Size</b>	<b>Number</b>
Sticker (October)	3 kind (Javan Hawk-eagle, Water & Forest)	10 x 10 cm	@ 1000
T-shirt (June)	2 kind of Javan Hawk-Eagle picture	All size	50
Cotton bag (June & April)	4 kind (Javan Hawk-eagle)		100
Pin (June)	1 kind (Javan Hawk-Eagle heads)	3 x 3 cm	100
Key holder (June)	1 kind (Javan Hawk-eagle)	2 x 5 cm	100
Contour Map Scale model of BUTAHU (August)	1 (scale 1: 50,000)	121 x 100 x 13	
Leaflet (October)	2 kind	B5	@ 3000
Bulletin (April & July)	2 kind		500

Some stickers such in this awareness material was very assistive in propagating program issue and other environmental issue, that was as a means in Environmental Education, also as a means of promotion program. In exhibition, this gift sticker had own the important role because gave an interest to all visitors and the society to know farther the effort of saving the Javan Hawk-eagle. This matter was seen from reaction of all exhibition visitors when they accepted the sticker, they became interest to know more about Project Garuda activities. Beside that, there were some people and institution asking for this material to be worn as means supported for their activity.



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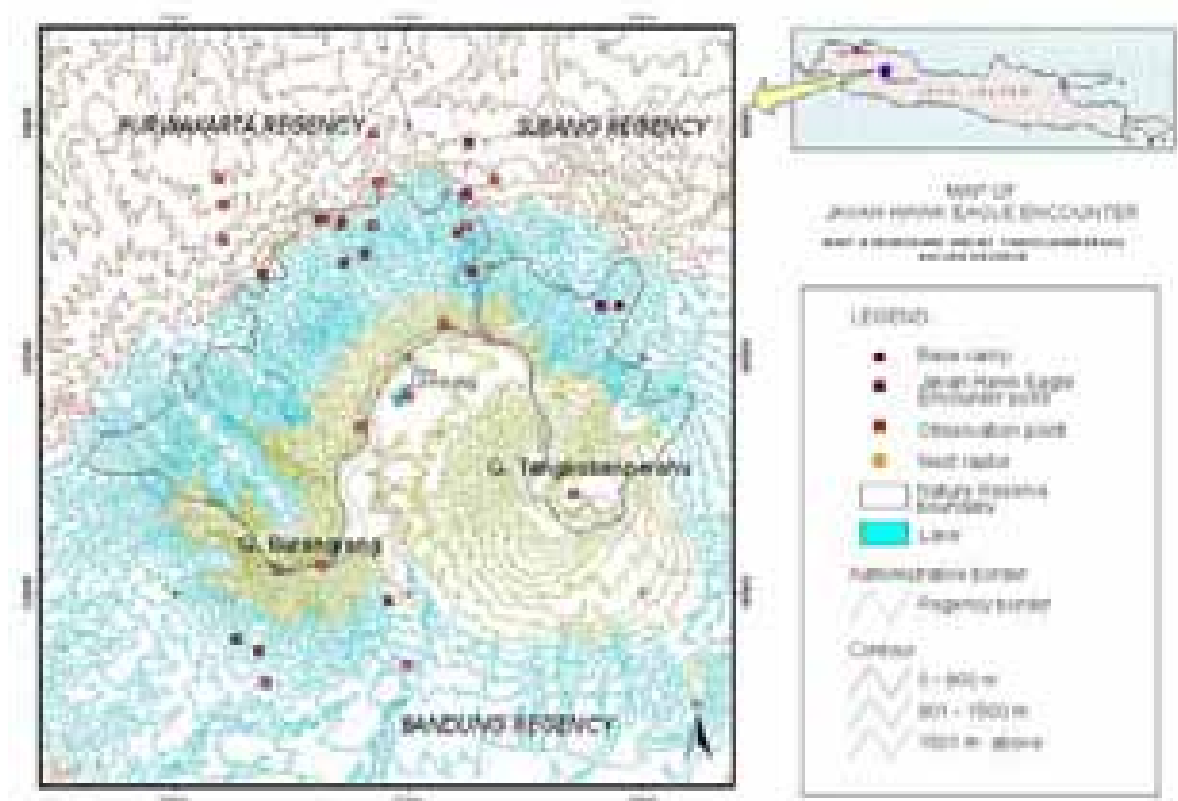
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**Appendix 1**

**Observation Sites**



Observation sites	Coordinate
Base Camp	S6 43 22.0 E107 37 01.3
Nest area	S6 43 22.6 E107 36 54.2
Ciasem	S6 43 22.6 E107 36 54.2
Cileungsing	S6 42 23.4 E107 33 42.9
Cibakom	S6 42 26.0 E107 33 53.7
Curug Cisolak	S6 42 54.0 E107 33 55.6
Cibakom	S6 42 26.0 E107 33 53.8
Cisalada	S6 42 48.1 E107 34 09.4
Cileungsing	S6 42 23.4 E107 33 42.1
Pondok Marjuki Curug Cijalu	S6 42 59.4 E107 35 24.5
Curug Cikondang	S6 42 06.0 E107 35 20.7
Curug Cilamaya	S6 42 28.1 E107 35 20.8
Desa Cipancar	S6 41 56.3 E107 35 39.5
Curug Cilemper	S6 42 32.9 E107 35 14.2
Kampung Cisair	S6 42 38.6 E107 32 33.1
Batutulis Cisair	S6 42 14.2 E107 32 31.3
Nyalindung	S6 47 45.6 E107 33 02.9
Curug Cisarap	S6 41 58.2 E107 34 19.5

Observation sites	Coordinate
Cipulus	S6 41 56.3 E107 32 28.0
Sarongge	S6 43 02.0 E107 32 58.5
Cijanggal	S6 47 32.1 E107 34 40.1
Situ Lembang	S6 44 25.0 E107 34 39.4
Lawang Angin	S6 46 48.2 E107 34 27.4
Curug Cisarap	S6 41 58.2 E107 34 19.4
Nyalindung	S6 47 45.6 E107 33 02.8
Curug Cimanah Rasa	S6 41 23.9 E107 34 14.7
Pasir Limus	S6 44 47.2 E107 34 07.4
Cikadu	S6 42 27.7 E107 34 15.5
Perkebunan Kina	S6 41 31.0 E107 35 20.8
Cisurupan	S6 47 15.4 E107 32 42.6
Kawah TangkPrahu	S6 45 33.0 E107 36 35.7
Pnck Burangrang 1	S6 46 27.1 E107 33 09.6
Pnck Burangrang 2	S6 46 23.7 E107 33 41.1
G. Sunda	S6 43 36.4 E107 35 05.3
Psr Tarikolot	S6 47 23.5 E107 32 58.1
Bukitbaru Taringgul	S6 42 24.9 E107 33 38.1

**Appendix 2.**

The Vegetation list at BuTahu area

TP=Tangkuban Perahu; B=Burangrang ; T =Tree; H=Herb; B=Bushes

Family	Scientific Name	Local Name	TP	B	Category
Acanthaceae	<i>Strobilanthus sp</i>	Sobsi/ mene'e	+	+	T
Amaryllidaceae	<i>Allium odorum</i>	Bawang kucai	-	+	H
Ampelidaceae	<i>Leea aequata</i>	Sulangkar	+	-	T
Apocynaceae	<i>Chilocarpus suaveolens</i>	Bihbul	-	-	T
Apocynaceae	<i>Alstonia scholaris</i>	Lame	-	+	T
Araceae	<i>Alocasia sp</i>	Cariwuh	-	+	T
Araceae	<i>Amorphophallus annulifer</i>	Bunga Bangkai	+		H
Araceae	<i>Colocasia esculenta</i>	Taleus	-	+	H
Araceae	<i>Colocasia sp</i>	Taleus gunung	-	+	H
Araliaceae	<i>Aralia ferox</i>	Panggung	+	+	T
Araliaceae	<i>Villebrunea rubescens</i>	Nangsi	+	-	T
Arecaceae	<i>Calamus sp</i>	Hoe cacing	+	+	B
Asteraceae	<i>Ageratum conyzoides</i>	Babadotan	+	+	H
Balsaminaceae	<i>Impatiens balsamina</i>	Pacar air	+	+	H
Calorifoliaceae	<i>Viburnum lutescens</i>	Sawuheun	+	-	B
Commelinaceae	<i>Pollia thyrsoiflora</i>	Gewor	-	-	T
Compositae	<i>Eupatorium riparium</i>	Teklan	+	+	H
Compositae	<i>Sambucus sp.</i>	Ki papatong	+	+	B
Compositae	<i>Gynura crepidioides</i>	Sintrong	-	+	H
Compositae	<i>Eupatorium odoratum</i>	Ki rinyuh	+	+	B
Crusiferae	<i>Brassica juncea</i>	Sawi	-	+	H
Cyateaceae	<i>Alsophila glauca</i>	Paku tiang	+	+	T
Cyperaceae	<i>Cyperus papyrus</i>	Teki ageung	+	-	H
Dilleniaceae	<i>Dillenia pentagyna</i>	Junti	-	+	T
Euphorbiaceae	<i>Acalypha caturus</i>	Ki raway	+	+	B
Euphorbiaceae	<i>Antidesma tetrandrum</i>	Seueur	+	-	T
Euphorbiaceae	<i>Breynia microphylla</i>	Tjeutjeurenian	+	+	B
Euphorbiaceae	<i>Glochidion molle</i>	Ki huut	-	+	B
Euphorbiaceae	<i>Homalanthus giganteus</i>	Kareumbi daun besar	+	+	T
Euphorbiaceae	<i>Macaranga sp</i>	Mara	+	+	T
Euphorbiaceae	<i>Macaranga triloba</i>	Mara beureum	+	-	T
Euphorbiaceae	<i>Maglietia glauca</i>	Baros	+	+	T
Euphorbiaceae	<i>Mallotus paniculatus</i>	Calik angin	+	+	T
Euphorbiaceae	<i>Bischofia javanica</i>	Gadog	+	+	T
Fabaceae	<i>Toona sureni</i>	Suren/ surian	+	+	T
Fagaceae	<i>Castanopsis argentea</i>	Saninten	-	+	T
Fagaceae	<i>Castanopsis sp</i>	Tarihtih	+	+	T
Fagaceae	<i>Castanopsis tungurrut</i>	Tunggereut	+	-	T
Fagaceae	<i>Quercus sp</i>	Pasang	+	-	T
Fagaceae	<i>Quercus sundaica</i>	Kayang	-	+	T
Gleicheniaceae	<i>Gleichenia linearis</i>	Paku api	+	+	H
Gramineae	<i>Gigantochloa verticillata</i>	Awi gombong	+	+	T
Labiatae	<i>Hyptis capitata</i>	Jukut Bau	+	-	H
Lauraceae	<i>Actinodaphne glabra</i>	Huru payung	+	-	T
Lauraceae	<i>Cryptocarya caesia</i>	Huru koneng	-	-	T
Lauraceae	<i>Litsea angulata</i>	Huru minyak	+	-	T
Lauraceae	<i>Litsea cassiaefolia</i>	Huru merang	+	-	T
Lauraceae	<i>Litsea cubeba</i>	Lemo	+	-	T
Lauraceae	<i>Litsea fulva</i>	Huru kacang	+	-	T
Lauraceae	<i>Litsea sp</i>	Huru dapung	+	+	T
Lauraceae	<i>Litsea tomentosa</i>	Leuksa	+	-	T
Lauraceae	<i>Litsea velutina</i>	Huru bodas	-	-	T
Lauraceae	<i>Phoebe cuneata</i>	Huru taleus	+	-	T
Lauraceae		Huru mangkrang	+	-	T
Lauraceae		Huru nangka	+	-	T
Magnoliaceae	<i>Magnolia macklottii</i>	Cempaka tunjung	+	-	T
Malvaceae	<i>Hibiscus macrophyllus</i>	Tisuk	-	+	T
Malvaceae	<i>Sida retusa</i>	Sidagori	+	-	H
Malvaceae	<i>Urena lobata</i>	Pungpurutan	+	+	H
Melastomataceae	<i>Clidemia hirta</i>	Harendong bulu	+	+	B
Meliaceae	<i>Dysoxylum ramiflorum</i>	Marangginan	-	-	T
Meliaceae	<i>Sandoricum koetjapi</i>	Sentul/ kecap	+	-	T
Mimosaceae	<i>Albizia montana</i>	Sengon/ jeungjing	-	+	T
Mimosaceae	<i>Caliandra calorthyrus</i>	Kaliandra	+	+	T
Mimosaceae	<i>Caliandra haematocephala</i>	Kaliandra	-	+	T
Moraceae	<i>Artocarpus elasticus</i>	Teureup	-	+	T
Moraceae	<i>Artocarpus integra</i>	Cempedak	-	+	T

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Family	Scientific Name	Local Name	TP	B	Category
Moraceae	<i>Ficus fistulosa</i>	Beunying darat	+	+	T
Moraceae	<i>Ficus grossularioides</i>	Hamerang	+	+	T
Moraceae	<i>Ficus grossularioides</i>	Hamerang	+	+	T
Moraceae	<i>Ficus hispida</i>	Bisoro	-	+	T
Moraceae	<i>Ficus indica</i>	Kiara	+	+	T
Moraceae	<i>Ficus variegata</i>	Kondang	+	+	T
Musaceae	<i>Musa zabrina</i>	Cau cole	+	+	T
Myristicaceae	<i>Myristica inners</i>	Ki amis (huru)	-	+	T
Myrsinaceae	<i>Rapanea avenis</i>	Ki jambe	+	-	T
Myrsinaceae	<i>Ardisia zollingeri</i>	Huru kadu	+	-	T
Myrtaceae	<i>Eucalyptus alba</i>	Kayu putih	+	-	T
Myrtaceae	<i>Eugenia cuprea</i>	Ki tambaga	+	-	T
Myrtaceae	<i>Eugenia javanica</i>	Jambu samarang	-	+	T
Myrtaceae	<i>Syzigium aromaticum</i>	Cengkeh	-	+	T
Myrtaceae	<i>Syzigium rostratum</i>	Ki sireum	+	+	T
Palmae	<i>Arenga pinnata</i>	Aren	-	+	T
Palmae	<i>Daemonorops rubra</i>	Pelah	+	-	T
Pandanaceae	<i>Freycinetia insignis</i>	Pandan hutan	+	+	T
Pandanaceae	<i>Pandanus caricosus</i>	Harashas	+	+	B
Pinaceae	<i>Pinus merkusii</i>	Pinus	-	+	T
Piperaceae	<i>Piper aduncum</i>	Seseureuhan	+	+	L
Plantaginaceae	<i>Anotis hirsuta</i>	Kahitutan	+	+	B
Polygalaceae	<i>Polygala paniculata</i>	Akar wangi	+	+	H
Polypodiaceae	<i>Dryopteris japonica</i>	Paku hayam	+	-	H
Rillieriaceae	<i>Tetraceara scandens</i>	Ki banen	+	+	T
Rosaceae	<i>Rubus molucianus</i>	Hareueut	+	-	T
Rubiaceae	<i>Cinchona sp</i>	Kina	+	+	T
Rubiaceae	<i>Cinchona succirubra</i>	Sulibra	+	+	T
Rubiaceae	<i>Coffea sp</i>	Kopi	-	+	T
Rubiaceae	<i>Hypobathrum frutescens</i>	Ki kopi	+	-	T
Rubiaceae	<i>Morinda citrifolia</i>	Cangkudu	-	+	T
Rubiaceae	<i>Nauclea lanceolata</i>	Cangcaratan	+	-	T
Rubiaceae	<i>Urophyllum arboreum</i>	Ki cengkeh	+	-	T
Rutaceae	<i>Evodia latifolia</i>	Ki sampang	+	-	T
Smilacaceae	<i>Smilax macrocarpa</i>	Kanar	+	-	T
Smilacaceae	<i>Smilax zeylanica</i>	Ki barera	+	-	T
Solanaceae	<i>Brugmansia suaveolens</i>	Kecubung	+	+	T
Solanaceae	<i>Capsicum frutescens</i>	Cengek	-	+	H
Sterculiaceae	<i>Kleinhovia hospita</i>	Bintinu	+	+	T
Symplocaceae	<i>Symplocos fasciculata</i>	Jirak	+	-	T
Actinidiaceae	<i>Saurauia pendula</i>	Ki leho	+	+	T
Theaceae	<i>Camelia sinensis</i>	Teh	+	+	T
Theaceae	<i>Schima walichii</i>	Puspa Meuhmal	+	+	T
Theaceae	<i>Schima walichii</i>	Puspa	+	+	T
Theaceae	<i>Thea lanceolata</i>	Ki enteh	-	+	T
Tiliaceae	<i>Sloanea sigun</i>	Tebe	+	+	T
Urticaceae	<i>Laportea stimulans</i>	Pulus munding	+	+	T
Urticaceae	<i>Leucosyce capitellata</i>	Beunteur	+	-	T
Urticaceae	<i>Pilea microphylla</i>	Pohpohan	+	+	H
Verbenaceae	<i>Lantana camara</i>	Saliara	+	+	B
Verbenaceae	<i>Stchytarpheta jamaicensis</i>	Jarong	+	+	H
Vitaceae	<i>Vitis repens</i>	Hariang	+	-	L
Zingiberaceae	<i>Costus speciosus</i>	Pacing	+	+	H
Zingiberaceae	<i>Alpinia sp</i>	Lipung	+	+	H
Zingiberaceae	<i>Alpinia sp</i>	Tepus	+	+	H
	<i>Clibadium sp</i>		+	-	H
	<i>Curculigo capitulata</i>	Congkok	+	+	H
	<i>Dieffenbachia fournier</i>	Kasintu	+	-	T
	<i>Erigeron sumatrensis</i>		-	+	H
	<i>Memecylon rostatum</i>	Ki beusi	+	+	T
	<i>Payena acuminata</i>	Ki jenggot	-	+	T
	<i>Poikilospermum suaveolens</i>	Kondang pati besar	+	+	T
	<i>Scheffera aromatica</i>	Ramogiling	+	+	T
		Bitarua	-	+	T
		Kakia	+	-	T
		Kalimorot	-	+	T
		Ki ateul	+	-	T
		Ki buah	-	+	T
		Ki simeut	+	-	T
		Ki tando	+	-	T

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**Appendix 3**

**Bird Species recorded in BuTahu**

Site record: 1=Cisurupan, Puncak Burangrang, Lawang Angin; 2=Panaruban to Ciasem; 3=Basecamp & nest area; 4=Cileungsing; 5=Cijanggal;  
6=Pasir Menyany; Protected : Y=Protected by Indonesian Law No 5, 1990 & No 7, 1999; II=Appendix 2 CITES; IUCN Category; Vu = Vulnerable

Scientific Name	English Name	Local Name	Sites Record						Remarks
			1	2	3	4	5	6	
ACCIPITRIDAE									
<i>Pernis ptilorhinchus</i>	Oriental Honey Buzzard	Sikep Madu Asia							Y
<i>Spilornis cheela</i>	Crested Serpent-eagle	Elang Ular	+	+	+	+		+	Y,II
<i>Accipiter trivirgatus</i>	Crested Goshawk	Elang Alap Jambul							Y
<i>Accipiter gularis</i>	Japanese Sparrow-hawk	Elang Alap Nipon							Y
<i>Accipiter soloensis</i>	Chinese Goshawk	Elang Alap Cina							Y
<i>Ictinaetus malayensis</i>	Black Eagle	Elang Hitam	-	+	+			+	Y
<i>Spizaetus cirrhatus</i>	Changeable Hawk-eagle	Elang Brontok	-		+	+		+	Y,II,Vu
<i>Spizaetus bartelsi</i>	Javan Hawk Eagle	Elang Jawa	-		+			+	Y
<i>Hieraaetus kienerii</i>	Rufous-bellied Eagle	Elang Perut Karat							Y
<i>Microchierax tringillarius</i>	Black-thighed Falconet	Alap-Alap Capung						+	Y
FALCONIDAE									
<i>Falco molluccensis</i>	Spotted Kestrel	Alap-alap Sapi	+						Y
PHASIANIDAE									
<i>Arborophila javanica</i>	Chestnut-bellied Partridge	Puyuh Gongong Jawa							Y,E
<i>Gallus gallus</i>	Red Jungle Fowl	Ayam Hutan Merah	+						
TURNICIDAE									
<i>Turnix suscitator</i>	Barred Button-quail	Gemak Hutan							
<i>Coturnix chinensis</i>	Blue-breasted Quail	Puyuh Batu						+	
COLUMBIDAE									
<i>Ducula aenea</i>	Mountain Imperial Pigeon	Pergam Hijau		+		+			
<i>Macropygia uncall</i>	Barred-cuckoo Dove	Uncal Loreng	+						
<i>Streptopelia chinensis</i>	Spotted Dove	Tekukur Biasa	+	+					
PSITTACIDAE									
<i>Loriculus pusillus</i>	Yellow-throated Hanging-parrot	Serindit Jawa							Y,E,II
CUCULIDAE									
<i>Cacomantis merulinus</i>	Plaintive Cuckoo	Wiwik Kelabu	+	+					
<i>Cacomantis sepulchralis</i>	Rusty-breasted Cuckoo	Wiwik Uncuing	+	+		+	+		
<i>Cuculus saturatus</i>	Oriental Cuckoo	Kangkok Ranting	+	+					
<i>Centropus bengalensis</i>	Lesser Coucal	Bubut Alang-alang	+	+					
TYTONIDAE									
<i>Bubo sumatranus</i>	Barred Eagle-owl	Beluk Jampuk						+	
STRIGIDAE									
<i>Otus lempiji</i>	Collared Scops-owl	Celepuk reban							
CAPRIMULGIDAE									
<i>Batrachostomus javensis</i>	Javan Frogmouth	Paruh Kodok Jawa						+	
APODIDAE									
<i>Collocalia linchi</i>	Cave Swiftlet	Walet Sapi	+	+					
<i>Collocalia esculenta</i>	Glossy Swiftlet	Walet Sapi						+	
<i>Apus affinis</i>	Little Swift	Kapinis Rumah							
HEMIPROCINIDAE									
<i>Hemiprocne longipennis</i>	Grey-rumped Tree Swift	Tapekong Jambul					+		
ALCEDINIDAE									
<i>Todirhampus cyanoventris</i>	Javan Kingfisher	Cekakak Jawa		+					Y,E
<i>Todirhampus chloris</i>	Collared Kingfisher	Cekakak Sungai		+		+			Y
BUCEROTIDAE									
<i>Aceros undulatus</i>	Wreathed Hornbill	Julang Emas			+				Y,II
CAPITONIDAE									
<i>Megalaima corvina</i>	Brown-throated Barbet	Takur bututut		+		+			Y,E
<i>Megalaima javensis</i>	Black-banded Barbet	Takur Tulungtumpuk				+			Y,E
<i>Megalaima armillaris</i>	Orange-fronted Barbet	Takur Tohtor	+	+		+			Y,E
<i>Megalaima australis</i>	Blue-eared Barbet	Takur Tenggeret			+				
<i>Megalaima haemacephala</i>	Coppersmith Barbet	Ungkut unkut			+				
PICIDAE									
<i>Dendrocopos moluccensis</i>	Sunda Woodpecker	Caladi Tilik						+	
<i>Dendrocopos macei</i>	Fulvous-breasted Woodpecker	Caladi Ulam							
<i>Reinwardtipicus validus</i>	Orange-backed Woodpecker	Pelatuk Kundang			+				
<i>Picus puniceus</i>	Crimson-winged Woodpecker	Pelatuk Sayap Merah							
EURYLAIMIDAE									
<i>Eurylaimus javanicus</i>	Banded Broad Bill	Sempur Hujan Rimba			+				
HIRUNDINIDAE									
<i>Hirundo rustica</i>	Barn Swallow	layang-layang Asia	+						
<i>Hirundo striolata</i>	Striated Swallow	Layang-Layang Loreng	+						
CAMPEPHAGIDAE									
<i>Tephrodornis gularis</i>	Large Woodshrike	Jingjing Petulak			+				
<i>Hemipus hirundinaceus</i>	Black-winged Flycatcher-shrike	Jingjing teureup			+				
<i>Pericrocotus flammeus</i>	Scarlet Minivet	Sepah kecil			+				
<i>Pericrocotus miniatus</i>	Sunda Minivet	Sepah gunung			+				
CHLOROPSIDAE									
<i>Aegithina tiphia</i>	Common Iora	Cipoh Kacat							

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Scientific Name	English Name	Local Name	Sites Record						Remarks
			1	2	3	4	5	6	
PYCNONOTIDAE									
<i>Alophoixus bres</i>	Grey-cheeked Bulbul	Empuloh janggut	+	+					
<i>Pycnonotus bimaculatus</i>	Orange-spotted Bulbul	Kutilang gunung	+						
<i>Pycnonotus aurigaster</i>	Sooty-headed Bulbul	Cucak Kutilang		+					
<i>Pycnonotus goiavier</i>	Yellow-vented Bulbul	Merbah cerukcuk							
DICRURIDAE									
<i>Dicrurus macrocercus</i>	Black Drongo	Srigunting hitam		+		+			
<i>Dicrurus leucophaeus</i>	Ashy Drongo	Srigunting kelabu	+	+					
AEGITHALIDAE									
<i>Psaltria exilis</i>	Pygmy Tit	Ceracet Jawa		+					
PARIDAE									
<i>Parus major</i>	Great Tit	Gelatik Batu Kelabu	+						
SITTIDAE									
<i>Sitta azurea</i>	Blue Nuthach	Munguk loreng		+				+	
TIMALIIDAE									
<i>Napothera epilepidota</i>	Eye-browed Wren-babbler	Berencet berkening							
<i>Pnoepyga pusilla</i>	Pygmy Wren-Babbler	Berencet kerdil		+				+	
<i>Stachyris thoracica</i>	White-bibbed Tree-babbler	Tepus leher putih		+					
<i>Stachyris melanothorax</i>	Crescent-ched Babbler	Tepus pipi perak	+	+					Y,E,Vu
<i>Macronous gularis</i>	Striped Tit-babbler	Ciung Air Coreng					+		
<i>Alcippe pyrrhoptera</i>	Javan Fulvetta	Wergan Jawa	+						
<i>Pteruthius flaviscapis</i>	White-browed Shrike-babbler	Ciu Besar	+						
<i>Pteruthius aenobarbus</i>	Chestnut-fronted Shrike-babbler	Ciu kunyit	+	+					
TURDIDAE									
<i>Brachypteryx leucophrys</i>	Lesser Shortwing	Cingcoang coklat	+	+					
<i>Enicurus velatus</i>	Lesser Forktail	Meninting kecil	+	+				+	
<i>Enicurus leschenaulti</i>	White-crowned Forktail	Meninting besar		+					
<i>Cochoa azurea</i>	Javan Cochoa	Ciung Mungkal Jawa				+			
SYLVIIDAE									
<i>Prinia familiaris</i>	Bar-winged Prinia	Perenjak Jawa		+				+	
<i>Prinia polychroa</i>	Brown Prinia	Perenjak Coklat						+	
<i>Orthotomus ruficeps</i>	Ashy Tailorbird	Cinenen kelabu	+						
<i>Orthotomus sepium</i>	Olive-backed Tailorbird	Cinenen Merah		+		+			
<i>Orthotomus cuculatus</i>	Mountain Tailorbird	Cinenen gunung						+	
<i>Tesia superciliaris</i>	Javan Tesia	Tesia Jawa						+	
<i>Megalurus palustris</i>	Striated Grassbird	Cica koreng	+	+					
<i>Phylloscopus trivirgatus</i>	Mountain Leaf-warbler	Cikrak Daun	+						
<i>Cettia vulcania</i>	Sunda Bush-warbler	Ceret Gunung	+						
<i>Seicercus grammiceps</i>	Sunda Warbler	Cikrak Muda	+	+					
MUSCICAPIDAE									
<i>Eumyas indigo</i>	Indigo Flycatcher	Sikatan ninon		+					
<i>Ficedula westermanni</i>	Little Pied Flycatcher	Sikatan belang		+					
<i>Ficedula hyperythra</i>	Snowy-browed Flycatcher	Sikatan Bodoh						+	
<i>Ficedula mugimaki</i>	Mugimaki Flycatcher	Sikatan Mugimaki	+						
<i>Ficedula zanthopygia</i>	Yellow Rumped Flycatcher	Sikatan Emas		+					
<i>Rhinomyias olivacea</i>	Fulvous Chested Jungle-flycatcher	Sikatan Dada Coklat		+					
<i>Rhipidura javanica</i>	Pied Fantail	Kipasan belang						+	Y
<i>Rhipidura phoenicura</i>	Rufous-tailed Fantail	Kipasan ekor merah		+				+	
<i>Culicicapa ceylonensis</i>	Grey headed Flycatcher	Sikatan Kepala Abu		+					
ARTAMIDAE									
<i>Artamus leucorhynchus</i>	White-breasted Wood-swallow	Kekep Babi							
LANIIDAE									
<i>Lanius schach</i>	Long-Tailed Shrike	Bentet Kelabu	+	+					
NECTARINIIDAE									
<i>Nectarinia jugularis</i>	Olive-backed Sunbird	Burung-madu sriganti		+					Y
<i>Aethopyga siparaja</i>	Crimson Sunbird	Burung-madu raja		+					Y
<i>Aethopyga eximia</i>	White-flanked Sunbird	Burung Madu Gunung	+						Y
<i>Aethopyga mystacalis</i>	Scarlet Sunbird	Burung Madu Jawa		+					Y
DICAUIDAE									
<i>Dicaeum concolor</i>	Plain Flowerpecker	Cabai polos		+					
<i>Dicaeum trochileum</i>	Scarlet-headed Flowerpecker	Cabai jawa	+	+					
ZOSTEROPIDAE									
<i>Zosterops papelbrosus</i>	Oriental White-eye	Kacamata biasa	+	+		+	+		
<i>Zosterops montanus</i>	Mountain White-eye	Kacamata gunung		+					
<i>Lophozosterops javanicus</i>	Javan Grey-throated White-eye	Opior Jawa		+				+	
PLOCEIDAE									
<i>Lonchura leucogastroides</i>	Javan Munia	Bondol Jawa					+		
<i>Lonchura punctulata</i>	Scaly-breasted Munia	Bondol peking							
<i>Lonchura maja</i>	White-headed Munia	Bondol haji							
<i>Erythrura hyperythra</i>	Tawny-breasted Parrot-finch	Pipit hijau							
<i>Passer montanus</i>	Eurasian Tree Sparrow	Golejra							

YPAL, 2004

**PROJECT GARUDA**

*The Conservation effort of the Javan Hawk-eagle and its habitat  
At Mt. Burangrang -Tangkuban Perahu Nature reserve  
West Java Indonesia*

**Appendix 4a****Environmental Education Activity in Sangkuriang Elementary School, Subang**

<b>Meeting</b>	<b>Location</b>	<b>Themes</b>	<b>Aim</b>	<b>Activity</b>
I 09/28/2002	Tea Plantation, Class room	Forest	To introduce the forest to students, benefit and it's function, and also forest damage impact and how we preserve it	Experienced perception around school, slide twiddling, games and discussion
II 10/19/2002	Tea Plantation, Class room	Javan Hawk-eagle	To introduce the Javan Hawk-eagle, how to do birdwatching, and also about student awareness to animal	Animal watching in tea plantation, movie show, games and discussion
III 11/02/2002	Class Room	Water	To introduce the water cycle, the benefits and how to preserve it	Give water cycle theory , presentation, game and discussion
IV 03/22/2003	Class room and school yard	Plant diversity and erosion	Students know the diversity of plant and its benefit Students know the process of erosion and how to prevent it	Detective game and discussion Erosion simulation and discussion
V 04/23/2003	School yard	Water pollution	Students aware of water pollution grade now and in the past, and how the polutan process	<i>Gobak Sodor</i> traditional game, made an essay about water pollution, and discussion
VI 05/03/2003	School yard	Food chain	To introduce the life forms and the relationships among it, also the process of food chain	Food chain presentation, and discussion
VII 05/24/2003	Class room and school yard	Garbage	Students can recycle and reuse the garbage	Made some recycle handmade and discussion
VIII 06/21/2003	School yard	Extinction	Students aware how the extinction happened to the life form	Games, group reports, and discussion

**Appendix 4b****Table 3.2 Environmental Education Activity in Hikmah Teladan Elementary School, Bandung**

<b>Meeting</b>	<b>Location</b>	<b>Themes</b>	<b>Aim</b>	<b>Activity</b>
I 09/21/2002	Cikole Camping Ground (the entire students)	Introducing the Forest	To introduce the forest condition so the students understood the differences with the school or neighborhood condition, and students also understood about the whole thing in forest	Nature observation, nature painting, games, and discussion
II 10/14-15/2002	Class room and school garden	Plant diversity	To introduce plant diversity and its benefits to our life	Detective game and discussion
III 10/21-22/2002	Class room and school garden	Plant diversity	To introduced the plant characteristics as a life form and its part	Detectives games and discussion
IV 10/28-29/02	Class room	Questionnaire	To evaluate the students understanding about environment	Questionnaire as an evaluates material
V 04/10/2003	School yard	Erosion	Students understood the process of erosion	Erosion simulation and discussion (2 <sup>nd</sup> , 3 <sup>rd</sup> , and 4 <sup>th</sup> grade)
V 04/17/2003	Class room	Plant diversity	Students understood about plant throught its character	Games and discussion about the diferences of the leaf (4 <sup>th</sup> grade)
VI 04/03/2003	School yard	Water polutant	Students understood the water polution grade in past and present, and also understood the polutant process	<i>Gobak sodor</i> traditional games and discussion
VII 05/01/2003	School yard	Food chain	To introduce the life form and the relationship among it, also the process of food chain	Food pyramids games and discussion (2 <sup>nd</sup> and 3 <sup>th</sup> grade) Simulation and presentation (4th grade)
VIII 05/ 8/2003	Class room	Garbage	Students can recycle and reuse the garbage	Made some recycle handmade and discussion
IX 06/28/2003	School yard	exhibition	To introduce and distribute the activity of Environmental Education	Exhibition and questionnaire for the parents