13~16 Jan 2012

7th ARRCN Symposium on Asian Raptors

Raptor Migration and Conservation in Asia

Venue:
Grace Hill (Ganghwa) &
Hantan River Spa Hotel (Cheorwon),
Republic of Korea

Asian Raptor Research and Conservation Network &
National Park Research Institute &
Ornithological Society of Korea

PROCEEDINGS OF
THE 7th SYMPOSIUM ON ASIAN RAPTORS
Raptor Migration and Conservation in Asia

13-16 January 2012
Ganghwa and Cheorwon, Republic of Korea

Editors:
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Committee for the 7th Symposium on Asian Raptors

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ISBN: 9788997491087

SUGGESTED CITATION:

Choi, C. Y., H. Y. Nam, G. C. Bing, and H. Y. Chae (eds). 2012. Proceedings of the 7th Symposium on Asian Raptors: Raptor Migration and Conservation in Asia. National Park Research Institute, Namwon, Korea.

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PREFACE

I am very pleased to hold the seventh ARRCN Symposium in the Republic of Korea through collaboration with the Korean National Park Research Institute.

First, I would like to express my heartfelt appreciation to all members of the Organizing Committee in Korea who have devoted themselves to preparations for this engaging Symposium. I also am grateful to several organizations including the Ministry of Environment in Korea for supporting us with this valuable opportunity to promote raptor research and conservation activities in Asia.

After the establishment of the ARRCN in 1999, 6 Symposiums on Asian Raptors have been held at different countries throughout the region. Through these Symposiums and other related workshops such as the Conservation of Rainforest, the Borneo-Kalimantan Project, and so on, the number of raptor researchers has increased in each country in Asia.

However, knowledge and skills in regards to raptor research and management are still not as fully developed they could be. Therefore, the ARRCN decided to hold a special workshop on raptor research and management techniques during the 6th Symposium in Mongolia through the support of the Peregrine Fund. It was a very important opportunity for raptor researchers in Asia to improve their ability to promote raptor research and conservation in their own countries. However, it was very regrettable that Indonesian members could not join the Symposium due to visa problems. Thankfully, those issues have been resolved, and we have full participation in our seventh symposium.

Therefore, I am very happy to hold special plenary sessions on raptor migration and raptor conservation to increase our knowledge about raptors again during this Symposium. In addition, two special sessions on raptor conservation in Asia and raptor migration in Asia are planned. I believe that these sessions will be important opportunities for us not only to understand

the latest updated raptor research and conservation in Asia but also to share among us basic information relating to raptor management.

It is well known that an important flyway and wintering area for many migratory birds is located here in Korea, yet these birds live on natural resources distributed across huge ranges transcending national borders. It is clear that all habitats consisting of breeding areas, wintering areas, and flyways are necessary for migratory birds. Especially Korea is the most important wintering area for substantial flocks of Cinereous Vultures as well as waterfowl. Therefore, it is necessary to conserve habitats in Korea to maintain the rich biodiversity of wildlife in all of Asia.

Raptors stand at the top of the food chain in the ecosystem so that their conservation inevitably leads to nature conservation overall. Raptor conservation in Asia is therefore one of the most important strategies for the maintenance of a rich and stable natural environment for us.

I’m sure that this Symposium will provide precious opportunities for all participants to inspire each other, thereby creating a new stage for raptor research and conservation for the benefit of both humans and fowl in Asia.

May Raptors forever fly over in the blue sky of the Republic of Korea!!

Toru Yamazaki

President, Asian Raptor Research and Conservation Network

OPENING REMARKS

I would like to express my sincere appreciation to all of you who came from Korea and many other countries for your attendance today. Furthermore, I am glad that the Korea National Park Service can hold the 7th ARRCN symposium with the Ornithological Society of Korea and the ARRCN Secretariat here in Ganghwa County, a homeland of clean nature and a long history.

In Korea, the famous quotation '*Sichimi-tteda*' meaning 'pretending not to know' was originated from the Korean traditional falconry. Like this example, Korean people have coexisted with powerful and friendly birds of prey for a long time. However, because of their sensitiveness as top predators to environmental changes, many birds of prey are currently threatened.

National Park Research Institute established the Migratory Birds Center in 2005 to discover the secret of migration of raptors as well as other migratory birds in terms of conservation. Therefore, I am sure that this symposium entitled 'Raptor Migration and Conservation in Asia' may be a new momentum for raptor researches in Asian countries as well as Korea.

On behalf of the Organizing Committee, I appreciate Korean Ministry of Environment, Cultural Heritage Administration, Shinan County, Gangwha County, and Cheorwon County for their kind supports to this symposium and other conservational activities in Korea. I also give my gratitude to 11 environmental organizations and companies in Japan which donated important grants for many raptor researchers.

Lastly, I wish that the invaluable experiences of each participant can be shared as information for raptor conservation through this symposium. Thank you.

Heak-Gyun KWON
Director, National Park Research Institute

WELCOMING ADDRESS

At the time of wintering period of many raptors in the coldest season throughout a year in Korea, I am very pleased to hold the 7th Symposium on Asian Raptors with outstanding raptor researchers and stakeholders from Korea and many other countries.

Korea National Park Service has greatly dedicated to conserve and mange natural resources of 20 National Parks and to successfully recover nature and forests that are important habitats in raptor conservation. However, the habitat loss and degradation throughout Korea caused by rapid economic growth still threats the raptors' survival. Although we have many problems to conserve raptors in Korea, it is true that we don't have sufficient information and experiences to solve the problems. Therefore, the Korea National Park Service has tried to remove the knowledge gap by establishing the Migratory Birds Center which has contributed in migration researches.

I am sure that this symposium will be a great opportunity for researchers, park managers, and local government officers in terms of capacity building for raptor conservation and management in Korea.

As many raptors cross national boundaries, international cooperation and information sharing between different countries are critical parts of successful raptor researches and conservation. I wish many researchers and stakeholders to share information and experiences and to develop more chances for raptor conservation through this symposium in Korea and elsewhere in Asia.

Concluding my congratulatory address, I wish to express my appreciation to President Toru Yamazaki of ARRCN, Dr. Rick Watson of Peregrine Fund, Dr. Keith Bildstein of Hawk Mountain Sanctuary, Professor Yoo Jeong-Chil of the Ornithological Society of Korea, Acting Mayor Yoon Young-joong of Ganghwa County, Mayor Park Woo-Ryang of Shinan County, President Ahn Yeon-soon of the National Institute of Biological Resources, and other honored guests who attended this symposium in spite of harsh coldness. Thank you.

Kwang-soo CHUNG
Chairman, Korea National Park Service

WELCOMING ADDRESS

I would like to express welcome to many raptor researchers and conservationists from diverse Asian Countries.

As top predators in a ecosystem, birds of prey are indicator species representing the stability and health of the ecosystem. However, the loss of habitats and biodiversity caused by the rapid economic growth and human activities is threatening most of raptors worldwide.

The increase of carbon dioxide and the subsequent global mean temperature rise affect the whole ecosystem. This phenomenon may change migratory patterns and food resources of raptors. Given that the higher rate of climate change in the Korean Peninsula, birds of prey in Korea may be more vulnerable to such environmental changes. Therefore, in order to conserve migratory raptors, we should protect natural environments of major stopover sites in Korea through international cooperation with other Asian countries.

As a result of the CBD COP 10 held in October 2010 at Nagoya, Japan, the Nagoya Protocol on the Access to Genetic Resources and Benefit-Sharing (ABS) was adopted. Consequently, the importance of biological resources has been highlighted worldwide, and the interest in species conservation and habitat managements has been increased. To follow up these trends, the Korean Ministry of Environment (K-MOE) established the Master Plan for the Conservation, Management, and Usage of Biological Resources in Dec 2010, and developed the Biodiversity Conservation and Usage Act. In addition, K-MOE has monitored, managed, and conserved birds and their habitats through Nationwide Environmental Surveys, National Winterbird Censuses, Shorebirds Monitoring, and so on. Furthermore, MOE also supports the activities of the East Asian-Australasian Flyway Partnership to join the international cooperation for conservation.

I hope that this symposium will be a good opportunity for many people to understand the importance of ecosystem conservation and diverse value of birds of prey.

It is the coldest season throughout a year in Korea. However, I wish that your passion and faith for raptor conservation will overcome the harsh coldness. Thank you.

Yeon-soon AHN

President, National Institute of Biological Resources

CONGRATULATORY REMARKS

Welcome to the researchers and volunteers of Asian countries and Korea, who visit Ganghwado Island to attend the 7th International Symposium of ARRCN, and I am really happy to join this symposium to share the recent research results and conservation strategies on raptors.

Shinan County, located in the south-western coast of Korea far away from here Ganghwado, consists of 1004 islands boasting its beautiful seascape and a vast tidal flat of 378km^2, which is about 14% of the entire area of tidal flats in Korea. Since these islands and tidal flats are designated and managed as Dadohae National Marine Park, Jeungdo Provincial Tidal Flat Park, Jangdo/Jeungdo Ramsar Wetlands, Breeding sites of Seabirds, and UNESCO Biosphere Reserve, the angel's paradise of Shinan is an international heritage in itself.

Especially, the islands and islets of Shinan are important as breeding and stopover sites for raptors. The White-tailed Sea Eagle breeds only at Heuksando Island in Korea, and several islands are known as breeding sites of the Peregrine Falcon and the Eurasian Eagle Owl. In addition, thousands of raptor such as the Oriental Honey Buzzard and the Chinese Sparrowhawk are observed during spring and fall seasons. Therefore, Shinan County is quite interesting in the research and conservation of birds of prey and showing really deep congratulations on the 7th International Symposium of ARRCN.

Shinan County and Korean National Park Services have annually held International Migratory Birds Symposium from 2007. Thus, we are really well aware of the importance of international cooperation. Without cooperation between countries serving breeding, stopover and wintering grounds, it will be impossible to protect endangered birds.

As I look forward to this symposium taking a step forward through many future-oriented suggestions, I wish good health and luck to all the participants here. Thank you.

Woo-Ryang PARK
County Mayor, Shinan-gun

CONGRATULATORY REMARKS

The Republic of Korea is a breeding and wintering ground as well as stopover area of diverse birds of prey in Asia. Today, I am deeply honored to meet outstanding raptor researchers and conservationists here in Korea, particularly in Ganghwa County. I also appreciate all the works and efforts of the Asian Raptor Research and Conservation Network, National Park Research Institute, organizing committee and staffs.

It is clear that the rapid economic development and subsequent environmental degradation cause habitat loss of wildlife and often threat ecosystems. However, realistic countermeasure and mitigation plans against these threats are still limited. I hope that this symposium will be an opportunity to increase the public awareness on the environmental conservation through the information and experience sharing among researchers and stakeholders.

Ganghwa County is often regarded as a 'Museum without a Roof' which has excellent tourism resources, historic remains as well as beautiful natural environments. I recommend you to experience Ganghwa County if you have some time.

Lastly, I wish your successful symposium on Asian Raptors. Thank you.

Young-joong YOON
Acting Mayor & Vice-mayor, Ganghwa-gun

CONGRATULATORY REMARKS

It is a great pleasure to have been asked to convey a congratulatory message on the occasion of the 7th ARRCN (The Asian Raptor Research & Conservation Network) Symposium on Raptor Migration and Conservation in Asia.

Raptors have been suffered from environmental changes caused by humans and are highly vulnerable. Therefore an action plan for raptors is needed urgently to save their habitats, especially breeding and wintering sites. To conserve their habitats and promote habitat restoration, we need a proactive ecosystem approach: a strategy for the integrated management of habitats of raptors in the internationally cooperative manner.

Over ten years, the Asian Raptor Research & Conservation Network has played a key role in conservation of Asian raptors. It has contributed significantly to exchanging information and coordinating researches concerning raptors in Asia.

I hope that this symposium will facilitate cooperative works with countries having the breeding, wintering and stop-over sites of raptors and will strengthen international conservation networks and bring about an agreement including governments, scholars, NGOs and local people from asian countries.

On behalf of the Korean Society of Ornithology, I wish to express my appreciation to President Toru Yamazaki of ARRCN, Minister YOO Young Sook of the Ministry of Environment, Administrator KIM Chan of the Cultural Heritage Administration, Chairman CHUNG Kwang-soo of the Korea National Park Service, Acting Mayor YOON Young-joong of Ganghwa County, Mayor JEONG Hojo of Cheorwon County, and Mayor PARK Woo-Ryang of Shinan County. I would also like to extend my sincere appreciation to the today's speakers, Dr. Keith Bildstein of Hawk Mountain Sanctuary and Dr. Rick Watson of Peregrine Fund.

Professor YOO Jeong Chil
President, the Ornithological Society of Korea

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THE GEOGRAPHY OF RAPTOR MOVEMENTS: NEW AND OLD WAYS OF STUDYING AN IMPORTANT BIOLOGICAL PHENOMENON

Keith L. Bildstein

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The geography and ecology of raptor movements remains an active and exciting sub-discipline within the field of raptor biology. Traditional tracking methods, including banding, color banding, and wing tagging, together with the miniaturization of GPS satellite telemetry equipment and the expanding use of GSM-GPS tracking units, GPS data loggers, and light-sensitive geolocators, are providing new information on the geography of both the large-and small-scale movements of birds of prey. Concurrently, experimental physiological data loggers are providing new insights into the metabolic costs of such movements, and new analytical tools, including "path annotation," are allowing researchers to probe the intricacies of how weather and topography affect these movements. Additionally, direct observations of raptor flight behavior at water crossings are helping us better understand how potential barriers to migration shape the geography of raptor movements. I use examples from recent studies of the movements of New and Old World vultures, a New World caracara, and other raptors to suggest ways in which an effective mix of old and new methods can help us better understand the ecology of birds of prey and the intrinsic and extrinsic forces that determine their distributions and abundances.

RAPTOR CONSERVATION WORLDWIDE

Rick Watson

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The Peregrine Fund has conducted raptor conservation projects worldwide for over 40 years. We have identified several elements that are consistently important for successful raptor conservation. These include a scientific understanding of the species' status and factors limiting its distribution and abundance. The latter usually requires quantitative studies on the species' population ecology and behavior which typically precede conservation interventions. If the species is in decline, the cause must be resolved before conservation can be successful but, in some cases, experimental restoration may be initiated even before the cause is known and reintroduced birds studied to learn what factors limit their survival. A well defined and achievable conservation goal helps to focus effort on conservation actions that will make a measurable difference. Such interventions must be adapted to the goal, and methods have usually involved restoration through captive breeding and release of critically endangered species, habitat protection, and public awareness to reduce shooting and other anthropogenic effects such as use and misuse of pesticides, poisons, and drugs. Sufficient funding over time is one of the most important resources needed, but talent and skill are just as important and often overlooked. Talent includes people with the knowledge, experience, passion, drive, and determination to be successful. Developing skill locally is important for success, but finding the right mix of knowledge and passion is often difficult, especially in developing nations where conservation is considered a luxury by the rural poor, and well-educated individuals prefer desk-jobs in the city near the comfort of home. Other useful elements include organizational support, a method for annually evaluating results, and a strategy that includes adaptive management of the project as new information is gained. We have found that working

collaboratively with people who may be responsible for the species' demise produces better, long-term results than confrontation and litigation, and a cooperative philosophy also appeals to land owners and financial donors whose support is often needed. Laws can be either beneficial or detrimental to conservation results, even if they were intended to be beneficial, and should be introduced sparingly and preferably only after voluntary compliance has been tried first. These elements will be described and explained in the context of four critically endangered species and one vulnerable species: Peregrine Falcon recovery, successfully completed; California Condor recovery, a successful project that is ongoing and still responding to new information; Asian *Gyps* vulture population crash, which presents some new challenges; Madagascar Fish Eagle conservation, to illustrate conservation success in one of the world's poorest nations; and Harpy Eagle conservation which aims to avoid species endangerment before more expensive interventions are needed. I will conclude with an evaluation of raptor conservation needs and priorities in Asia to help guide new conservation and research efforts in the region.

Special Session I

Raptor Conservation in Asia

RAPTOR CONSERVATION IN MONGOLIA

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To date, a total of 44 species of raptors belonging to 3 families and 17 genera are known in Mongolia. According to the IUCN Global Assessment, 1 species (2.3%) is Endangered (EN), 5 species (11.4%) Vulnerable (VU), 3 species (6.8%) Near Threatened (NT), and 35 species (79.5%) Least Concern (LC) within all occurring species in Mongolia. The globally threatened species (CR, EN, VU) are: Egyptian Vulture, Greater-spotted Eagle, Eastern Imperial Eagle, Pallas's Fish Eagle, Saker Falcon and Lesser Kestrel. Regional species assessment conducted in 2009 suggests that 3 species (6.8%) of raptors were assessed Endangered, 3 species (6.8%) Vulnerable, one species (2.3%) Near Threatened, 24 species (54.5%) Least Concern, 8 species (18.2%) Not Applicable, and 5 species (11.4%) Data Deficient. Of these, the Short-toed Snake-eagle, Greater-spotted Eagle, and Pallas's Fish Eagle were assessed as Endangered whilst the Bearded Vulture, Eastern Imperial Eagle and Saker Falcon were assessed as Vulnerable. For the population trend of raptors in Mongolia, 26 species of raptor are "stable", 2 species are "decreasing" and 16 species are "unknown". Species richness differs across the country. High species' richness has occurred at Mongol Daguur Steppe, Hentii Mountain Range, Dornod Mongol Steppe (north-eastern and central Mongolia), Northern Khangai and Mongol-Altai Mountain Range (western Mongolia) possibly due to these areas being located in Central and East Asian Migratory Flyways. Dominant threats to Mongolian raptors which are affecting all species are: tree cutting (11.8%), transport (9.7%), mining (9.2%), poisoning (9.2%), tourism (8.8%), fire (8.8%), pylon and building collision (8.4%), predators (8.4%), drought (8.0%), shooting (6.3%), and others (habitat loss and degradation, pathogens or parasites, hydroelectric dams, water pollution, and entanglement with fishing lines and ropes (11.3%).

From these threats, the highest mortality rate for raptor has occurred at the 15 KV power line, covering 5000 km in the steppe. Raptor species occurring in Mongolia has been protected under laws and regulations at national and international levels. At the national level: Mongolian Red Data Book (covered White-tailed Eagle and Himalayan Vulture as rare species), the single species national action plan for Saker Falcon issued by the Mongolian Government 21/03/2005), and Rare Birds Mongolian Governmental Act No. 264 in 2001. At the international level: CITES Appendix I and II, Conservation of Migratory Species of Wild Animals - CMS or Bonn Convention and others. All occurring raptors in Mongolia, including vagrants, occur within 4 types of protected areas with approximately 10.7% (max. 47.7%, min. 7%) of all species' distribution range. For Asian raptor biologists, it is urgent that we assess all species occurring in our own country using IUCN categories and criteria in order to implement international collaborative conservation measures and to compare the species status based on standard assessments. In order to conserve raptor species in Mongolia, national and international collaborative activities such as artificial nest platforms on electric poles, re-design of the high power electric line of 15 KV, cutting the use of rodenticide in the steppe, and reinforcement of government control for legal and illegal trading of Saker Falcon are essential and should be implemented in the near future.

RAPTOR CONSERVATION IN THAILAND

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In Thailand, there are fifty-five species of diurnal raptors, including kites, hawks, eagles and vultures. All species are legally protected under the Wildlife Protection and Conservation Act of the Kingdom of Thailand. The raptors in the country inhabit a wide range of habitats, and prey upon other animals in such habitats thus act as umbrella species. Certain raptor species generally hunt prey that negative affect the crops of farmers thus may be regarded as biological control. However, threats to the raptor exist, and comprise poaching for keeping as pet, hunting for being pest to domestic chicken, and inadvertent poisoning when the raptor feed on poisoned animal carcasses in open habitats such as ricefield. Conservation strategy used to raise public awareness in important habitats that annually harbor the wintering raptors or on passage have focused on the involvement of local communities where the habitats for raptors exist. The actions include annual raptor watch festival for raptor migration in Radar Hill, Prachuap Kiri Khan and Khao Dinsor, Chumphon in southern Thailand, and the Eagle Watch Festival, Phetchaburi in central Thailand, as well as bird-related events such as Thailand Bird Fair, to publicize the importance, and enhance the awareness of wild raptors as the top of the food chain, and their beneficial life style to the farmers, and in order to alleviate the threats the wild raptors have faced with. On the other hand, knowledge on raptor ecology remains little. Research on the biology, ecology, and natural history of the wild raptors play no less important to the awareness strategy to be used as guidelines for long-term conservation plans.

STATUS OF RAPTOR CONSERVATION IN MALAYSIA

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Malaysia consists of two territories, Peninsular Malaysia at the southernmost tip of continental Asia and East Malaysia, on the island of Borneo. Malaysia has a rich diversity of raptors and owls due to its location in the tropics of the Oriental region and on the flyways of migratory birds. At least 44 species of raptors and 20 species of owls are currently known to occur in Malaysia. The raptors are represented by 18 resident species, 16 migratory species, three species with both migratory as well as resident populations and seven vagrants. The owls are represented by 16 residents, two migrants, one species with both a migratory as well as resident population and one vagrant. Eight raptors, Lesser Fish Eagle (*Ichthyophaga humilis*), Grey-headed Fish Eagle (*Ichthyophaga ichthyaetus*) Cinereous Vulture (*Aegypius monachus*), Mountain Serpent Eagle (*Spizaetus kinabaluensis*), Greater Spotted Eagle (*Aquila clanga*), Eastern Imperial Eagle (*Aquila heliaca*), Wallace's Hawk Eagle (*Spizaetus nanus*), White-fronted Falconet (*Microhierax latifrons*) and three owls, White-fronted Scops Owl (*Otus sagittatus*), Reddish Scops Owl (*Otus rufescens*) and Mantanani Scops Owl (*Otus mantananensis*) are listed as globally threatened. Three migratory raptors, Oriental Honey-buzzard (*Pernis ptilorhynchus*), Black Baza (*Aviceda leuphotes*) and Chinese Sparrowhawk (*Accipiter soloensis*) occur annually in regionally significant numbers. Most of the resident raptors and owls are associated with forest habitats. Loss of forest habitats and, to a lesser extent, hunting are the main threats to the survival of resident raptors and owls. Migrant raptors which overwinter and forage in ricefields face the risk of potential pesticide poisoning. Current conservation efforts for raptors and owls are mainly preliminary, with most studies related to the distribution and breeding of resident raptors, the passage of migratory raptors and the role of

owls for biological control in agriculture. The protected areas system in Malaysia provides a network of raptor and owl habitats throughout the country. As of 2007, about 50 % of the total land area (some 16 million ha) are protected as national parks, wildlife sanctuaries and permanent forest reserves. All raptors and owls are totally protected in Peninsular Malaysia but in East Malaysia, their protection status varies according to region and species. Malaysia is a signatory to the Convention on Biological Diversity, CITES and RAMSAR, whereby the country is committed to protect and conserve its biodiversity, including raptors and owls and their habitats.

Keywords: conservation, raptor, owl, Malaysia

STATUS AND CONSERVATION RAPTOR IN INDONESIA: CASE STUDY ON JAVAN HAWK-EAGLE *Nisaetus bartelsi* CONSERVATION EFFORTS IN INDONESIA

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Almost 75 raptor species from 90 species in Asia were recorded and distributed is several islands in Indonesia. All raptor species was protected by Indonesian law UU No 5/1990 and PP No 7 & 8/1991. Moreover, one of them the Javan Hawk-Eagle *Nisaetus bartelsi* become National Bird due to it resemble to Garuda-Indonesia National Symbol. Currently, the population of Javan Hawk Eagles was estimated amount 325 pairs in 62 locations of remain forested area in Java which 22 of them are non protected area. In other hands, they have heavy pressure which becoming dominant factors to population decline of those species. We estimated that numbers population decline of this species was reach to approximately on 20-25 pairs or 40-45 individuals per year. Indonesian government through species scientific authority (LIPI-Indonesian Institute of Science) and species management authority (PHKA-Forestry Department) in collaboration with Raptor Indonesia and other organizations was established Javan Hawk-Eagle Species Road Map

and Action Plan. The species road map was mention that Indonesia government targeting to increase 3% population of this species in the wild until 2014. Action plans is mentions detail of strategies plan on conservation action on this species in Indonesia.

Keywords: raptor, Indonesia, Javan Hawk-Eagle, species road map, species action plan

RAPTOR CONSERVATION IN INDIA

Justus Joshua[1], Varadarajan Gokula[2], Himani Kala[1]

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Raptors as predators are at the top of the ecological chain and their abundance are therefore indicators of the health of the environment. India, due to its geographical location, varied physical features and climatic types, has wide range of environmental conditions that has resulted in ten biogeographical zones which harbors around 69 species of raptors belonging to 25 genera and three families. Among these 25 genera, *Falco* with 11 species, *Accipiter* (eight species), *Circus* and *Aquila* each with six species and *Gyps* with five species, are the most dominant. Most of the genera are represented by <3 species, with 40% and 24% of the genera with only one and two species respectively. These include 28 migrants and rest resident breeders. Added, these include three endemic species (Nicobar Sparrowhawk, Great Nicobar Serpent Eagle and Andaman Serpent Eagle) and 19 threatened species that includes also the three endemics. Among the biogeographic zones, the species richness is high in Gangetic Plain and North East with both harboring 54 species each, followed by Himalayas with 50 species and least richness of 23 species in the Islands. Further, the resident and migratory status reveals that in seven of the biogeographic zones residents are high, while migrants were high in only three zones. Based on the presence of all species in different biogeographic zones, 33.8% (23) of species are found to be widespread, present in 8-10 zones, 41.2% (28) species are common, found in 4-7 zones, while 25% (17) are rare to very rare present in only 1-3 zones. Majority of the published work on raptors in India are predominantly opportunistic observations, however all these are very significant it is not enough for deriving and addressing the conservation issues. The analysis of 625 publications on various aspects/subjects of raptors, showed a maximum of 26.1% of the information to be on the distribution, other aspects such as

breeding (16.9%), general (13.9%), feeding (12.6%) and behavior (9.9%) covered to certain extent, while status & population, morphology & physiology, taxonomy, conservation, migration, hunting and on habitat were covered only to an extent of <5.5%, ranging from 5.1% (status & population) to 0.3% (habitat). In India there is enormous pressure on natural habitats, resources and biodiversity of the area, which along with hunting and raptors being trapped for trade has affected the habitats of the raptors and different species thus leading to decrease in their abundance. To reduce and stop these it is very important that systematic awareness and protection in all areas are very imperative. However these are important conservation actions, making the data available on various aspects of the ecology of each species would be of high priority. Presently specific ecological requirements are little known, population levels and trends, demography, habitat status, use and requirement, nesting, feeding, other natural history observations are not documented, while the threats faced and causes of declines are very poorly understood. The significance and need for specific studies and the status of conservation efforts made and the emphasis on the immediate need for information on certain habitats of the raptors and attention in terms of conservation of threatened and endemic species, specifically Lesser Fish-eagle, Indian Spotted Eagle, Shaheen Falcon and Great Nicobar Serpent-eagle in India are also discussed.

DATA OF BIRDS OF PREY FROM WILDLIFE RESCUE CENTERS IN SOUTH KOREA

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Based on the analysis of data including details, at least 248 cases (36.3%) had skeletal fractures from 682 rescued cases of raptors (Falconidae 99, Accipitridae 196 and Strigidae 387 cases). Results for causative agents based on confidential diagnosis data showed 25.5% exhausted (174), 20.8% collision cases including window strike, power line strike or hit by car (142), 14.1 % of orphans or kidnapped cases (96), 6.6% poisoning cases including secondary poisoning cases (45), and 5.1% gunshot (35). In case of exhausted cases, some cases could be related with avian disease problems but no any study has been conducted. In case of gunshot, radiographic studies are essential for determine but not many rescue centers had the equipment, so the number could be increased. We also tried to collect data from various rescue centers but the data were not sufficient for analyzing causative agents so, only final fates and species composition were studied. Some of collected data were from local veterinary clinics which are not specialized for wildlife rehabilitation; so there could be some wrong or false release data. Final results of total 4706 cases included 2187 (46.5%) release, 1173 (24.9%) died, 532 cases (11.3%) of dead on arrival (DOA which includes dead cases within 48 hrs after rescued) 227 cases (4.8%) of euthanasia, and 241 (5.1%) transfer cases. 4469 cases (15 species, 95.5%) were raptors designated as Natural Monuments by the Cultural Heritage Administration; 67 cases (2 species, 1.4%) were of Endangered Species Class Ⅰ, and 1551 cases (12 species, 33%) were of Endangered Species Class Ⅱ protected by the Ministry of Environment. Total 25 species recorded including Common Kestrel, Eurasian Eagle Owl, Brown Hawk Owl, Eurasian Scops Owl, Cinereous Vulture, Japanese Scops Owl, Eurasian Sparrowhawk, Common Buzzard,

Northern Goshawk, Tawny Owl, Peregrine Falcon, Eurasian Hobby, Chinese Sparrowhawk, White-tailed Eagle, Japanese Sparrowhawk, Long-eared Owl, Short-eared Owl, Merlin, Ural Owl, Rough-legged Buzzard, Honey Buzzard, Upland Buzzard, Steppe Eagle, Grey-faced Buzzard and Little Owl were recorded. Among them, most common top 10 species (in number and percent) were Common Kestrel (1179, 25.0%), Eurasian Eagle Owl (784, 16.6%), Brown Hawk Owl (740, 15.7%), Eurasian Scops Owl (710, 15.1%), Cinereous Vulture (373, 7.9%), Japanese Scops Owl (263, 5.6%), Eurasian Sparrowhawk (136, 2.9%), Common Buzzard (130, 2.8%), Northern Goshawk (113, 2.4%), and Tawny Owl (74, 1.6%). From 2004, the Ministry of Environment started establishing provincial wildlife rescue centers, and total 11 center are running. Wildlife rescue sector is a relatively new area and many professionals including veterinarians and rehabilitators are working harder. Standard data formats for each rescue center are being made and specialized knowledge will join for detail data collection. Some centers are collecting GPS coordinates, participating to ecological studies using various transmitter/tagging programs, as well as conducting infectious disease surveillance programs (such as West Nile Virus or Highly Pathogenic Avian Influenza). Through these kind of activities, the information and data for conservation of raptor species can be collected systematically in Korea.

RAPTOR CONSERVATION IN TAIWAN

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There are 32 species of diurnal raptors and 13 species of owls recorded in Taiwan. Only 8 species or diurnal raptors and 8 species of owls are totally resident in Taiwan. Members of Raptor Research Group of Taiwan (RRGT) and other researchers have studied Crested Serpent Eagle (*Spilornis cheela*), Indian Black Eagle (*Ictinaetus malayensis*), Crested Goshawk (*Accipiter trivirgatus*), Besra (*Accipiter virgatus*), Black-winged Kite (*Elanus caeruleus*) and Mountain Hawk Eagle (*Spizaetus nipalensis*). There have been long term studies on the Lanyu Scops Owl (*Otus elegans*) and the Tawny Fish Owl (*Ketupa flavipes*). There are ongoing research on Black Kite (*Milvus migrans*), Oriental Honey Buzzard (*Pernis ptilorhynchus*), Collared Scops Owl (*Otus bakkamoena*) and the Tawny Fish Owl. These studies relied on field observations, video recording, radio telemetry, molecular techniques, and pellet collections to understand the food and foraging, habitat use, breeding ecology, behavior and population genetics. A fair amount of data on other species of owls have been collected through caring for injured owls or through nest box programs. Being top carnivores in any ecosystem, the status of every raptor species is an important indicator to the health of the environment, and knowledge concerning raptors is crucial to conservation. We drafted an Action Plan for Black Kite in Taiwan in 2004, to provide a guideline to the conservation of the very small population of Black Kites in Taiwan. This year concerned individuals drafted an action plan for the conservation of Grass Owl (*Tyto capensis*) under the help of RRGT. We hope these efforts can focus relevant conservation efforts and bring the concerned populations back to a sustainable level. RRGT has been conducting annual Raptor Research Training Camps since 1996 to provide in depth information to participants. More than 200 persons have completed these programs. To

attract the general public to appreciate raptors, RRGT recently produced two nature films: “The Oriental Honey Buzzards of Nine-nine peaks” and “Phantom of the forest - the Black Eagle”. Each movie tells the story of a long term research. Through these efforts, we hope all the raptors and their habitat in Taiwan can beloved and protected.

OVERVIEW OF RAPTOR CONSERVATION IN JAPAN

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Japan is an island country in the shape of a crescent and extends 3,000 km long. It has 3,000 m-class mountains above sea level, and three-fourth of its national land is covered by undulating mountainous areas. The climate ranges from subtropical to subarctic zones. It is temperate and humid, and has clear seasonal difference, contributes to the variety of climates in Japan. The varied climate and topographical conditions, the steep topography with mountains and valleys, have largely influenced the makeup of biological diversity in Japan. To date, twenty-two species of Accipitridae, seven species of Falconidae and twelve species of Strigiformes are known in Japan; the human population density is so high. All species of raptors inhabiting Japan are strictly protected, and hunting or capturing them is prohibited unless permission and/or a license has been granted from wildlife protection authorities by the Wildlife Protection and Hunting Law. Poisoning and poaching of raptors are very little. The raptor habitat of Japan is characterized by its small size of the breeding population in the small land area. The major problems in the habitat are "food shortage" and "decreasing of breeding site". In the Red Date Book of Japan, five species are ranked in Critically Endangered (13.2%), six species in Endangered (15.8%), three in Vulnerable (7.9%) and four in Near Threatened (10.5%). Most of raptors are decreasing the number of individuals but goshawk seems to be increasing the population because of breeding also in the city area. In 1990s, many developments with negative impact on raptors were planned and became social problems, the interest in the conservation of raptors has increased among people. Ministry of the Environment have published the guide line for conservation and investigation of raptors in environmental assessment in 1997, and is working on the project "study of prevention measures of colliding

with wind farms" and other six projects with the total budget of nearly 961,500 US$ in this year. Forestry Agency is working on the Green Corridor project and others for habitat management at 47 areas with the total budget of nearly 2,470,000 US$. NGO and land developers are working on the various efforts for conservation in each position.

Special Session II

Raptor Migration in Asia

AN IMPORTANT RAPTOR MIGRATION SITES IN NORTHERN VIETNAM

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To date, a total of six raptor migration sites have been identified in northern Vietnam including Hoang Lien Sapa, Tam Dao, Cuc Phuong, Ba Vi, Xuan Thuy national parks and Soc pagoda areas of Hanoi city. A total of 23 migratory species have been recorded after ten years monitoring at both sites. The six most common species includes Grey-faced Buzzard *Butastur indicus*, Oriental Honey Buzzard *Pernis ptilorhynchus*, Chinese Sparrowhawk *Accipiter soloensis*, Japanese Sparrowhawk *A. gularis*, Himalayan Buzzard *Buteo burmanicus* and Common Kestrel *Falco tinnunculus*. The rarest species which has been recorded at only one site including Cinereous Vulture *Aegypius monachus*, Imperial Eagle *Aquila heliaca*, Steppe Eagle *A. nipalensis*, Golden Eagle *A. chrysaetos*, Short-toed Snake Eagle *Circaetus gallus* and Eurasian Sparrowhawk *Accipiter nisus*. Comparison between an identified sites, the ranks has been made and results show that Tam Dao is the most important site for raptor migration in northern Vietnam, next are Cuc Phuong, Ba Vi, Hoang Lien Sapa, Xuan Thuy national parks and Soc pagoda site. Due to an importance, the long term monitoring programs and watching sites have been setting up at Tam Dao, Cuc Phuong and Ba Vi national parks. Two main migration routes have been identified in the northern Vietnam includes; North to South-west and North-east to South-west in autumn and South-west to north; South-west to North-east in spring.

Keywords: Cuc Phuong, Xuan Thuy, Hoang Lien Sapa, Tam Dao, Ba Vi, Xuan Thuy, Soc pogoda, Grey-faced Buzzard, Oriental Honey Buzzard, Black Baza, Chinese Sparrowhawk, Japanese Sparrowhawk, Common Kestrel, Cinereous Vulture, Imperial Eagle, Steppe Eagle, Golden Eagle, Eurasian Sparrowhawk

MIGRATION IN SOUTHERN THAILAND 2002-2012

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The Isthmus of Kra in southern Thailand, approximately 475 km south of Bangkok, is an important flyway bottleneck where raptor migration can be monitored easily during both southbound and northbound migration. At least 26 diurnal raptor species have been observed in migration at four watch sites here. In October 2002, the first raptor watch festival was held just south of the city of Chumphon on Thailand's east coast to make the public aware of the country's importance for migrating birds of prey. This festival has been held each October ever since. In 2007-08, northbound raptor migration was first monitored at an inland site near Chumphon, called Promsri Hill, approximately 25 km from the east coast. In September 2009, a second coastal raptor watch site was established, approximately 20 km north of Chumphon, called Khao Dinsor (Pencil Hill). These watch sites generate considerable local income and favorable publicity for an area otherwise not often visited by foreign tourists. Locally, thousands of Thai children and adults have been introduced to the magnificent spectacle of migrating birds of prey. From a scientific and even bird-watching perspective, Khao Dinsor is superb - many raptors pass very close to the ridge so that sub-species identity can be determined directly or via digital photography. When results from coastal Khao Dinsor are compared to data collected at Radar Hill (established in 2005), an inland watch site approximately 80 km to the north, important differences in migration patterns will become apparent. Results from the first two years of monitoring at Khao Dinsor show that somewhere between 250,000 to 500,000 raptors pass south along the coast each autumn - the highest number of species and individuals anywhere in continental Southeast Asia. At least six species of Accipiter are migrants at Khao Dinsor

- likely the highest number of Sparrowhawk species of any site in the world. These include more than 120,000 Chinese Sparrowhawks (*Accipiter soloensis*), probably the most common migrating raptor in the region. By comparison, the Japanese Sparrowhawk (*Accipiter gularis*) has the longest migration period of any species in this area, beginning in late August and continuing until mid-November, at least. Other important migrants include Black Baza (circa 100,000 individuals each year), and non-raptors such as bee-eaters (three species) and needletail swifts (three species). Scientific papers on the southbound and northbound migration of birds in the Chumphon area have already been published in peer-review journals, and others are being prepared. In 2011 at Khao Dinsor, we received official government permits to trap and band migrating raptors, and this research will continue through 2015 at least. Our first-year banding results suggest that September migrants, particularly Accipiter species including Chinese and Japanese Sparrowhawks, are fairly easy to trap. We are eager to work with an international NGO on the satellite telemetry tracking of Chinese Sparrowhawks in the near future. Finally, in 2012, construction will begin on the Chumphon Raptor Center at Khao Dinsor where our educational and scientific activities will be based. The Thai government has invested almost $200,000 USD in this new facility. We look forward to hosting scientists and students from all over the world to understand the migration ecology and population dynamics of raptors and other birds (and insects) that pass through this region.

AN OVERVIEW OF RAPTOR MIGRATION IN MALAYSIA

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Malaysia's location, in relation to the rest of Asia, places the country on the three major migration corridors of the East Asian raptor flyway. Peninsular Malaysia, situated at the southernmost tip of mainland Asia, is an important transit point for migratory raptors using the Eastern Inland Corridor and Coastal Pacific Corridor. Borneo island, which includes the east Malaysian states of Sarawak and Sabah, lies near the terminus of the Oceanic Pacific Corridor, an over-water route with numerous islands that raptors use to "island-hop" from eastern Asia to south-east Asia. Some 26 species of migratory raptors have been reliably recorded in Malaysia. Of these, 16 species are passage migrants and winter visitors, three species are represented by both migratory as well as resident populations and seven are considered vagrants. In Peninsular Malaysia, autumn migration occurs along two routes, with the main passage following the western coastal plain and a lesser one through the east coast states. Spring migration routes are not so well-documented but northward passage through the central highlands has been regularly reported. In contrast to Peninsular Malaysia, raptor migration in East Malaysia is much less known although at least 18 migratory raptor species have been recorded for Borneo. At Tanjung Datu, a promontory on the western tip of Sarawak, raptors have been observed arriving from the sea, confirming autumn over-water migration across the South China Sea. Peninsular Malaysia has two migration hotspots where raptors pass over in significant numbers. At Taiping, Perak, annual autumn counts have recorded at least 19 migratory raptor species, with maximum count of about 63,400 raptors. At Tanjung Tuan, Malacca, spring migration counts have recorded at least 14 species of migrant raptors, with maximum count of about 73,000 raptors, mostly Oriental Honey-buzzards. In Peninsular Malaysia, the three

most abundant migratory raptor species, each with seasonal counts of more than 10,000 individuals, are Oriental Honey-buzzard, Black Baza and Chinese Sparrowhawk. Three threatened migratory raptors, Greater Spotted Eagle, Eastern Imperial Eagle and Cinereous Vulture, have been recorded in Peninsular Malaysia.

Keywords: raptor migration, Malaysia, Oriental Honey-buzzard, Black Baza

CURRENT INFORMATION ON MIGRATORY RAPTOR AND ITS CONSERVATION EFFORTS IN INDONESIA

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Several references mention that from 56 species of migratory raptors in Asia, 19 of them are recorded in Indonesia. We compiled current observation data on 2010 which collected from several locations in Sumatra, Jawa, Kalimantan, Bali and Lombok Strait that recorded approximately 55,657 Individuals which dominated by Chinese Goshawk *Accipiter soloensis* 78,36%, Oriental Honey Buzzard *Pernis ptilorhychus* dan Japanese Sparrowhawk *Accipiter gularis*. Migratory raptors in Wallace area recorded by Francisco Germi *et al.* in 2007 that recorded approximately 230,214 individual raptors dominated with Chinese Goshawk and 4,710 Grey Faced-Buzzard crossed over Sangihe Islands from Philippine. Information of wintering area of migratory raptors in Indonesia recorded by Syartinilia *et al*. 2010 based on satellite tracking on several individual of Oriental Honey Buzzard. Other research was conducted by Cahyono *et al*. 2011 based on visual observation on Migratory Osprey *Pandion haliaetus haliaetus* in Central Java. Indonesia archipelagoes are one of important sites for several migratory raptors in Asia as Migration route, stopover and wintering area. However, those migratory species in Indonesia are little known due to lack research activities on this area. In other hand, almost raptor communities in Indonesia still have high pressure with many various limited factors. Conservation efforts has been conducted by Raptor Indonesia in collaboration with other organization such as; a) Continuing Monitoring on Raptor Migration in Indonesia, b)

Establishment networking for monitoring raptor migration; c) Identification of important area/location for migratory raptors in Indonesia such as location of migration routes, stop-over and wintering area; d) increase public awareness on important values of conservation efforts on raptor migration and their important location in Indonesia through out Raptor Festival in several potential locations; e) An initiation for inclusion of Raptor Migratory into EAAFP (East Asian-Australian Flyway Partnership).

Keywords: migratory raptors, Indonesia archipelagoes, conservation

RAPTOR MIGRATION IN THE PHILIPPINES: AN OVERVIEW

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Although the Philippines is an important link in the East Asian flyway, very little is known about, and very little local interest is shown towards Avian Migration and much less Raptor Migration. The Philippines is not a chunk of land but rather a long archipelago consisting of a chain of over 7,000 islands with many remote nooks and crannies making the study formidable. However, lately, interest in Raptor migration has been sparked and as early as 2 years ago, soon after the birth of the Wild bird Club of the Philippines in 2004, some timid initial forays have been made into raptor migration. With information derived from neighboring countries and visiting raptor experts and the growing interest among the Bird Club members, perhaps a more organized raptor migration count can be had. Already a reliable fly-over has been identified in an area close to Manila where the counts are being made. Remote land fall areas pinpointed by studies from overseas counts have yet to be investigated.

MIGRATION OF ORIENTAL HONEY BUZZARDS AND OTHER ACCIPITRIDAE SPECIES RECOGNIZED BY OBSERVATION IN KOREA

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In Korea, 34 species of raptors (27 Accipitridae and 7 Falconidae) have been recorded. Of the Accipitridae species recorded, 45.5% are winter visitor, 21.2% are passage migrant, 18.2% are vagrant, 6.1% are resident and 9.1% are summer visitor. Most of them are listed as endangered species except vagrants in Korea and especially Oriental Honey Buzzard is a main migratory species among other raptors. This study was carried out to clarify the migration ecology of Oriental Honey Buzzard (*Pernis ptilorhynchus*) and other Accipitridae species in Korea for the purpose of proper conservation and management of those species from August 1, 2005 to October 6, 2009. Four areas (Hong island, Eocheong island, Socheong island and Geoje island) were selected for the migration research of the Oriental Honey Buzzard and other Accipitridae. The results of migration research in four areas show that these areas are important sites in migration routes of Accipitridae species and large flocks of migrating raptorial birds regularly stop over in these areas. In addition to this result, it was found that Oriental Honey Buzzard select different migration routes in spring and autumn. In spring, most of them migrate through Geoje island. In autumn, on the contrary, they migrate through islands of west coast of Korea: Hong island, Eocheong island and Socheong island. Those islands for stopover during autumn migration identified as new migration routes of these species. Consequently, departure and arrival area of this species could be estimated based on each migration patterns. Also it was found that the velocity and direction of the wind in the areas are important factors to influence the migratory status of this species. Those observation sites were identified as important habitats for the protection and conservation management of Accipitridae species in Asia region.

RAPTOR MIGRATION IN TAIWAN

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Taiwan has 20 diurnal species and 3 owls that are migratory. Chinese Goshawk (*Accipiter soloensis*) and Grey-faced Buzzard (*Butastur indicus*) are the most numerous species both in spring and in autumn. There are 9 raptor migration watch sites in Taiwan that has been monitored on and off, with more consistent efforts devoted to Kuanyinshan, Bakuashan, and Kenting. RRGT and hawk watchers have conducted simultaneous hawk counts from diverse locations for 3 springs hoping to get a better handle on the northward movement of raptors through Taiwan. The results showed that the three known raptor watching locations had the largest number of raptors passing over, thus are the most important monitoring locations when hawk watchers are limited in number. Daily records from 1989 to 2009 showed that peak spring and autumn migration time for Grey-faced Buzzards remains the same through years, whereas for Chinese Goshawks, there are signs that the spring dates are moving forward and the first quartile of the autumn migrants also pass through Taiwan slightly earlier in time.

Researchers used weather radar to monitor the migration path of Grey-faced Buzzards and Chinese Goshawk through southern Taiwan. There were also attempts to determine the relationship between age and timing of the northward migration of Grey-faced Buzzards. Others have attempted to identify roost sites in Taiwan through modeling. RRGT has been satellite tracking the migration of Grey-faced Buzzards since 2008. The population that passes through Taiwan comes south and returns north through China, instead of following the Ryukyu archipelago as assumed before. All satellite marked individuals winter in the Philippines. We do not yet know whether any of the birds seen to fly south from the Philippines into Indonesia and other islands are in the same population that pass through Taiwan. Research

on other migratory raptors are being planned. A study to clarify the species status of the migratory population of Brown Hawk Owl (*Ninox japonica japonica* and *N. j. totogo*) in Taiwan is underway.

SUMMARY OF MIGRATORY RAPTORS IN JAPAN

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Totally 29 species of diurnal raptors are recorded in Japan; 26 species of them are migratory birds, 12 species breed in Japan and move to wintering area in autumn, and 14 species breed in Eastern Asia. Most of them move to Southeast Asia through Japan, and some of them winter in Japan. I introduce about the investigation system of raptor migration, migratory routes and the counting result of major migratory raptors. Regarding observation sites, there are more than 30 in autumn, and more than 15 in spring. At each site, number of migratory raptors has been counted continuously by hawk count group. Those data are put on the website "Hawk Migration Network Japan" in the same day. Migratory raptors move from northeast to southwestern direction along the Japanese Islands in autumn and most of them winter in Southeast Asian. However, some populations of sparrow hawks and Common Buzzards winter in Japan. In spring, although most birds move north on the same route as they moved in autumn, most of Oriental Honey-buzzards and some Grey-faced Buzzards take different route through the Korean Peninsula to Japan.

Introduction

Field Trip &
Korean Falconry

CURRENT STATUS OF MANAGEMENT AND CHALLENGES IN FUTURE ON CINEREOUS VULTURE (*Aegypius monachus*) WINTERING IN KOREA

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This study was implemented based on the issue of concerns such as current status, problems, and future challenges of the Cinereous Vultures that pass the winter in Korea. Cinereous Vultures wintering in Korea are managed under the policies of Natural Monument (No. 243-1) of the Cultural Heritage Administration and the Wild Animal Management of the Ministry of Environment (Endangered Animal Class Ⅱ, Korea's RedList Vulnerable-VU). Above all, Korea's Cinereous Vultures are mainly managed through regular monitoring and food provision policies under the policy of Natural Monument by the Cultural Heritage Administration. Provision of food to the population of Cinereous Vultures passing the winter in Korea has started in terms of conservation of them when a population of 100 individuals or more came near Jeokseong-myeon, Paju in 1989. Since then, as provision of food has been carried out in the area next to DMZ as Cheorwon, Paju, Yanggu, Goseong, etc. and the southern area, larger number of entities were reported to appear. The Cultural Heritage Administration has been implementing regular nationwide census about the Cinereous Vultures that pass the winter in Korea twice a year (December and February) since 2002. Starting from 1,236 entities, the number of entities passing the winter in Korea is reported to be approx. 2,462 as of December 2010. Over about ten years, the number

of entities of Cinereous Vultures that pass the winter in Korea has increased by 200%, and it is a recent tendency that such phenomenon is being diffused toward the southern area. This group of Cinereous Vultures passing the winter in Korea has been maintained through perishes livestock coming from the livestock complex as well as the food provided by the Cultural Heritage Administration. Unfortunately, however, it takes a lot of expenses in maintaining such populations of Cinereous Vultures that sharply rise and especially it is difficult to supply perish livestock due to a large scale foot-and-mouth disease that occurred since November 2010. Recently, the Cultural Heritage Administration has established a virtuous cycle of food provision making use of perish livestock coming from the local livestock farm and livestock products of the livestock processing company in order to solve the problem of food for the Cinereous Vultures. This is, like the food provided for the Cinereous Vultures in Europe, a way of simultaneously reducing the livestock farm the cost for disposal of waste and securing the food for Cinereous Vultures by providing the Cinereous Vultures with perish livestock as foods rather than reclaiming and burning them as the waste. That is, it is beneficially linking ecological principle in terms of the cycle of material that the Cinereous Vultures are natural scavenger with the livestock farming industry. However, current Cinereous Vultures of Korea are exposed to the pending issues such as lack of foods due to the collapse of infrastructure of livestock farms and a measure of proper maintenance of the population of Cinereous Vultures.

Keywords: provision of food, virtuous circle, management of population

SHORT INTRODUCTION TO KOREAN FALCONRY

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The earliest evidence of the falconry in Korea may date back to 3 AD when the King Yuri of the Goguryeo Dynasty was fascinated with falconry (Ahn Jeong-bok. 1778. *Dongsa Gangmok*: Historical essay of Korea), and there are several records on many kings' falconry in several literatures such as the *Samguk-Sagi* (Kim Bu-sik. 1145. History of Three Kingdoms) and the *Samguk-Yusa* (Ilyeon. 1281. Memorabilia of the Three Kingdoms). Particularly, the wall painting in the Jangcheon No. 1 Tomb (a 5th century AD tomb of the Goguryeo Dynasty at Jilin Province in NE China) represents the first visual evidence of Korean falconry. Nearly for last 2,000 years, commoners have used Northern Goshawks for falconry in winter; therefore, the Korean traditional falconry has been developed mainly in northern parts of Korea where goshawks breed and where winter lasts longer. On the other hand, Peregrine Falcons called *Songgol* were more important raptors for year-round falconry in royal families of the Goryeo (918-1392 AD) and Joseon (1392-1910 AD) Dynasties. Governments of these two dynasties established royal offices named *Eungbang* or *Songgolbang* which trained raptors and managed their foods (mostly pigeons) for falconry. The offices also encouraged commoners to raise domestic pigeons for a substitute tax to the office as well as foods for breeders themselves. When the number of falcons was not sufficient in the office, people who trapped rare raptors (i.e. Gyr Falcons, Saker Falcons, and even Peregrines) were often granted fortunes or even official positions in governmental agencies. King Sejong (1397-1450) dispatched special envoys in 1444 to Hamgyeong and Pyeongan Provinces in northern Korea to know why the number of trapped falcons was gradually declining. As negative effects and burdens of the Royal falconry increased, the royal agency *Eungbang* was eventually closed down in the early 18th

century while private falconry has continued as winter sports and hunting techniques. According to a report in the early 1930s, a total of 1740 raptors including Northern Goshawks, Eurasian Sparrowhawks, Common Buzzards, and Peregrine Falcons was raised for falconry; about 85% of them were captive in the current territory of North Korea. However, because of the division of the Korean Peninsula, the Korean War, and the rapid economic growth, the tradition of Korean Falconry was nearly discontinued since 1960-1970s. The Korean falconry was nominated as an UNESCO Intangible Cultural Heritage of Humanity in 2010, and two master falconers currently try to continue the tradition.

Session III

Breeding Biology

PRELIMINARY RESULT OF AMUR FALCON *Falco amurensis* BREEDING BIOLOGY IN HUSTAI NATIONAL PARK, MONGOLIA

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The totals of 476 native species of birds are registered in Mongolian bird checklist. From these 223 species of birds of 119 genera, 43 families, 17 orders have been registered in Hustai National Park. The Hustai National Park is unique because various types of natural zones and habitats that play important for breeding and migrating raptors. From 1992 to 2010, 28 species belonging to 13 genera, 3 families of raptors were registered in the park. The total number of species in the park expresses 63.6% of all recorded raptor species in Mongolia. In Mongolia, Amur Falcon is a breeding visitor. This species breeds from lower Delgermörön, Ider, and Chuluut rivers to the upper Ulz river; North Khangai east to Tuul river valley, upper Herlen and Onon rivers; from Hövsgöl to Uur and Eg rivers; Orkhon, Selenge, Yeröö, Kharaa river valleys; lower Balj and Onon river valleys. S. Gombobaatar (2009) found more than 40 breeding pairs in poplar and birch trees along Khalkh river, O. Shagdarsuren (1963) found 18 breeding pairs in elm and poplar trees in Dornogobi province (Shagdarsuren, 1963 & 1984). M. Stubbe and his field members found breeding birds in the Gobi desert. Records follow as; a breeding record in Elm tree nest in Ömnögobi province. Breeding pairs arrive in their breeding sites by mid May - late May, depending on weather condition at breeding and wintering grounds. Breeding season continues from June to August. Breeding pairs nest in deserted and newly build nests of Magpie, Carrion Crow, Daurian Jackdaw, and occasionally Black Kite, Upland Buzzard in willow, pine, larch, poplar, elm and birch trees in forest, forest steppe, forested river valleys and patched forest in the steppe (Shagdarsuren, 1964 & 1983; Schafer, 2003; Schafer *et al*., 2004; Bold *et al*., 2005; Stubbe

et al., 2010; Tseveenmyadag *et al*., 2010; Gombobaatar, 2011). Since beginning of June until end of August we found 10 active nests of the Amur Falcon with 40 eggs. They nested in deserted nests of Magpie which located on the live elm and poplar trees. At 6th of June pairs starts to copulate. Female lays 3-5 eggs with non-glossy white or pale buffish with reddish brown blotches, spots and other markings. First hatching was observed 12th of July and first fledging was observed 8th of August. Chicks leave the nest at 27-31 days. When the chicks are large enough they climb and sit on branches near the nest. Since this time, both birds feed the nestlings. From those 40 eggs 2 eggs was over cooled and 38 of them successfully hatched. From these 38 chicks, 4 of them died by various causes, 34 of them successfully fledged. Since beginning of August until mid of September both adults and young birds perch on wires, trees and poles in open areas and hunt on small voles and other large insects.

FACTORS INFLUENCING NESTING SUCCESS OF EURASIAN BLACK VULTURES (*Aegypius monachus*) IN IKH NART NATURE RESERVE, MONGOLIA

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Eurasian Black Vultures are declining throughout most of their range, but a relatively large breeding population remains in Mongolia. Understanding the factors influencing breeding success promise to help conservation efforts for the species. We initiated a study of breeding pairs of vultures in and around Ikh Nart Nature Reserve, Dornogobi Aimag, Mongolia in 2003. Ikh Nart is an area of rocky outcrops that lies at the northern edge of the Gobi Desert, where dry steppe and semi-desert ecosystems meet. We collected data on a wide variety of variables associated with nest sites and monitoring nest sites periodically (at least 1x/month) during the nesting season from late February/early March to September. Most nesting attempts that failed did so during the incubation phase, with most hatchlings surviving to fledging. In contrast to our prediction, pairs that nested in trees fared as well as pairs that nested on rocky outcrops. We discuss factors influencing nesting success rates.

THE USE OF CAMERA TRAPPING FOR OBSERVING NESTING EURASIAN BLACK VULTURE (*Aegypius monachus*) CHICKS IN THE IKH NART NATURE RESERVE, MONGOLIA

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Camera trapping has become a very important tool for wildlife biologists. Camera traps can capture behaviors that are only performed when there are no observers present. For the past two field seasons (2010-2011) the Denver Zoological Foundation in collaboration with the Mongolian Academy of Sciences have placed camera traps (still and video) in Eurasian Black Vulture (*Aegypius monachus*) rock nests in the Ikh Nart Nature Reserve in southeastern Mongolia. The chicks being observed are within a couple of weeks of fledging. The camera traps have documented feeding behavior, grooming, stretching, practice flying, and visits from domestic livestock and other wildlife.

Acknowledgment: Funding provided by the Denver Zoological Foundation and EarthWatch.

SEXING NEAR-FLEDGLING-AGE NESTLINGS OF CINEREOUS VULTURES USING MORPHOMETRICS AND DISCRIMINANT FUNCTION ANALYSIS

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We examined the possibility of determining sexes of near-fledgling-age nestlings of Cinereous Vultures using several morphological measures and the discriminant function analysis. Discriminant analysis is a statistical technique to build predictive models based on observed predictor variables and to classify each observation into one of the groups. The discriminant function analysis is commonly used in bird studies to examine potential differences in behavior, resources use, feeding habit, physiological and morphological conditions between different age, sex, and other groups. One of the most common usages of discriminant function analysis is to predict sexes in monomorphic species that are similar in plumage and gross morphological differences. Plumage similarity of the cinereous vultures has been described as unreliable to differentiate cinereous vulture sexes by many authors; however, the morphological differences have not been extensively tested. We analyzed wing length, tail length, tarsus length, beak length, beak height, and weight of Cinereous Vulture nestlings whose sexes were determined by genetic methods. Data from adults were not available. Also we examined if combination of some variables are helpful to improve the predictive model. Analysis of variance used to compare all measurements found no significant differences between sexes. Discriminant function analysis provided no useful model for sexing fledgling-age-nestlings. Although females were more correctly classified than males, overall model performances were weak. Therefore, we recommend to use genetic or other reliable methods for sexing young Cinereous Vultures.

THE EFFECTS OF RODENTICIDE ON NESTLING AND BREEDING PERFORMANCE OF BARN OWL, *Tyto alba javanica*

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The effects of rodenticide on nestling and breeding performance of Barn Owl, *Tyto alba javanica* was investigated in immature oil palm plantation in Malaysia. Four treatment plots were established with three plots baited each with warfarin, brodifacoum and a protozoan based biorodenticide, *Sarcocystis singaporensis* plus a fourth non-baited control plot. Three rat baiting campaign were carried out during the study (six month interval). Nestlings body measurements namely: body mass, culmen length, tarsus length, wing length and tail length were taken from August to December 2009, i.e., after the third baiting campaign. Measurements were recorded every three days from hatching until 49 days old, i.e., several days before fledging. Nestlings in control plot showed superior for all parameter taken compared to rodenticides treated plots. Body mass of nestlings in control plot were heavier by 8.17%, 13.04%, and 6.88% compared to warfarin, brodifacoum and biorodenticide treated plots respectively. The culmen and tarsus length of nestling barn owls reached the adult size during the growth period; while culmen length in control plot was longer by 3.07%, 5.28%, and 1.41% compared to warfarin, brodifacoum and biorodenticide treated plots respectively. The tarsus length of nestlings in control plot was also longer by 2.40%, 3.08% and 3.36% compared to warfarin, brodifacoum and

biorodenticide treated plots respectively. In contrast with culmen and tarsus length, wing and tail length still grew until day 49 i.e., several days before fledging. The wing and tail length in control plot was shorter by 15.77% and 13.73% compared to adult size. Teratogenic sign was shown by one nestling in brodifacoum treated plot, where its primary feathers were malformed rendering it flightless besides tail length that were very short if compared to nestlings in control plot. Wing and tail length in brodifacoum treated plot was shorter by 15.26% and 18.24% respectively compared to control plot. Rodenticide exposure also affect breeding success of Barn Owl, where hatching success by barn owl in untreated control plot was 4.58±1.07 and significantly higher ($p>0.05$) if compared to biorodenticides (3.96±1.52), warfarin (2.17±0.80), brodifacoum (2.06±1.42). Fledging success for barn owl in untreated control plot (4.40±1.01) was also significantly higher if compared to biorodenticide treated plot (2.53±0.26), warfarin treated plot (1.52±0.73) and brodifacoum treated plot (0.50±0.17). HPLC analysis revealed 61.11% eggs collected from the warfarin treated plot contained warfarin residue ranging from 0.007 to 0.372 µg/g wet weight. And 66.67% eggs collected from the brodifacoum treated plot contained brodifacoum residue ranging from 0.002 to 0.061 µg/g wet weight.

Keywords: *Tyto alba javanica*, rodenticide nestling, breeding performance, teratogenic sign

PEREGRINE FALCON (*Falco peregrinus*) BREEDING PERFORMANCE DURING A PERIOD OF POPULATION RECOVERY IN SOUTHEASTERN SCOTLAND, 1964-2009

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Data for Peregrine Falcon (*Falco peregrinus*) breeding performance between 1964 and 2009 in the Lothian and Borders region, southeast Scotland were analyzed to identify environmental factors influencing site occupancy and breeding success. Occupancy and clutch size of birds using more marginal nest sites, both coastal and inland, was lower than for those using core sites. Mixed-effects models gave environmental predictors for site occupancy, egg viability and nestling survivorship for 110 nest sites. Coastal cliffs, nest sites facing east-northeast and sites managed for game birds negatively influenced occupancy. The number of sites occupied by breeding pairs increased through time, suggesting an increase in population size. Contrary to predictions from studies of other raptors, Peregrines using nest sites that were first occupied more recently consistently had eggs with higher viability, better nestling survivorship and so a higher fledging rate than those using sites first occupied in earlier years. Egg viability and nestling survivorship were both influenced by monthly mean daily temperatures. Increases in April and June temperatures were correlated with deceases in egg viability and survivorship only partly offset by increases in performance with higher May temperatures.

SOME ECOLOGICAL ASPECTS OF CRESTED SERPENT EAGLE *Spilornis cheela* IN KOLLI HILLS, TAMILNADU, INDIA

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Breeding ecology, nest-site selection, perching-site selection and prey items of the Crested Serpent Eagle *Spilornis cheela* were studied in the Kolli Hills during May 2005 to May 2010. In total, 32 active nests were located and of which nest-site details were collected from accessible 27 nests. Crested Serpent Eagle constructs no new nest but renews or alters the old available nests largely in December during the study period. Both the sexes involve in the renewal activities. The clutch size was single and the mean incubation period was 41.5 days. The mean fledging period was 64.5 days. Nests were found largely along the riverine patches and nest-sites differed from random - sites. The results indicate the mature and less disturbed riverine forests with large sized trees for the conservation of this species. The food habits of the eagle were studied from prey items brought into nest by the adult and prey items fed by the adult observed opportunistically during study period. In total, 173 feeding observations were made and the prey items varied form fish to mammals. In general, crested serpent eagles seem to prefer reptiles than any other group as reptile alone contributed around 74% followed by birds (18%). The eagle used a total of around 17 species of vertebrate prey. The Crested Serpent Eagle preferred to perch on the outer canopy of the tree found largely in the forest edges.

BREEDING BEHAVIOUR OF CRESTED SERPENT EAGLE *Spilornis cheela bido* (Horsfield, 1821) IN PEGUNUNGAN SERIBU, GUNUNG KIDUL, YOGYAKARTA, INDONESIA

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Pegunungan Seribu were located in Gunung Kidul District, Yogyakarta is one of karts ecosystem area with thin layer of the land and little source of water because of forming underground rivers. In this typically ecosystem, not many big trees growth and few animals including birds are living there. One of raptors communities recorded and has been adapted to this typically ecosystem is Crested Serpent Eagle (*Spilornis cheela bido*). The study was conducted to carry out breeding behaviour and breeding successful of Crested Serpent Eagle in this Karst Ecosystem including threats to this species in Pegunungan Seribu, Gunung Kidul, Yogyakarta. The study are was covered almost Pegunugan Seribu area in Gunung Kidul District, are: Panggang, Paliyan, Playen, Saptosari, Tepus, Girisubo, Nglipar, Patuk and Ngawen sub-districts. Broad survey, look down method and combined with cooperative research method was conducted to carry out a locality records of this species and nesting area of Crested Serpent Eagle in several potential locations. Direct / visual observations intensively was conducted on nesting of this species with using time scanning and look down methods to carried out data of breeding behaviour of this species. The Crested Serpent Eagle were recorded in 6 locations form 9 locations of study area, are; Paliyan, Panggang, Tepus, Girisubo, Ngawen, Nglipar and Playen. The active nest of this species were found on Sengon Tree (*Albizzia* sp.) in Wonosadi forested area in Ngawen Sub-district. Breeding behaviours of this species was recorded that beginning with courtship display among pairs, matting, egg laying, incubating, hatching and fledgling. The female will lay the egg and incubate it for approximately 35 days, Only the female incubates the egg, while the male does not.

DISTRIBUTION, BREEDING AND FORAGING ECOLOGY OF THE GREY-HEADED FISH EAGLE (*Ichthyophaga ichthyaetus*) IN SINGAPORE

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The globally near-threatened Grey-headed Fish Eagle (*Ichthyophaga ichthyaetus*) is a medium-bodied, piscivore that occurs by large open water bodies, particularly forested rivers and lakes throughout the Indo-Malayan region. Historically, the Grey-headed Fish Eagle is poorly known in Singapore, with no records since the 1950s until birds, apparently from southern Peninsular Malaysia colonised Singapore in the early 1980s. In our study, we conducted surveys in suitable habitats for breeding pairs across Singapore Island, which is supplemented with data from other observers and the published literature. Furthermore, we collected dietary data by analysing prey items by examining video stills of feeding individuals, collected during field sampling. Altogether, we recorded at least eight nests across Singapore, with a minimum of six active breeding pairs over 2010-2011 (Bukit Gombak, Mandai mangrove, Sarimbun, Kranji, Upper Seletar, Lower Seletar Reservoirs) and mean clutch size of two (n=4). Pairs and individual adults were observed at three other sites, but with no evidence of breeding. Most nest structures were observed in stands of the exotic Albizzia (*Paraseriantes falcataria*). The current estimated breeding population for Singapore is 12-18 although post-fledging survival remains unknown. While we lack turnover data, the population probably remains stable as young birds disperse into Southern Malaysia, given nearly full site occupancy on Singapore island. Altogether, we detected seven prey species, including one exotic reptile and four exotic fish species. Our study shows that grey-headed fish eagle, a nationally endangered species, is likely to persist well in Singapore's man-made landscape, given its adaptability to novel habitats and prey items. Our study

is one of few single-species study at a landscape scale for a predator in Southeast Asia, and also the first to document interactions between a threatened species and exotic species, thus highlighting the potential conservation value of novel secondary vegetation in suburban Singapore.

STUDIES ON THE BREEDING ECOLOGY OF THE GOSHAWK [NOTHERN GOSHAWK] *Accipiter gentilis* IN SOUTH KOREA

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This survey is on the breeding ecology of the Goshawk [Northern Goshawk] *Accipiter gentilis* inhabiting Eomjeong-myeon, Chungju-si, Chungcheongbuk-do from April 2007 to August 2011. Goshawks [Northern Goshawk] make nests on Japanese Larch *Larix leptolepis*, Japanese Red Pine *Pinus densiflora* and Pitch Pine *Pinus rigida* of 15.8±2.36 m (range = 7.4-18.67 m) in height and 31.4±8.60 cm (range = 20.8-47.1 cm) at the diameter-at-breast height (DBH). The size of breeding nests was 135.8±3.37cm in outer diameter, 26.2±2.39 cm in inner diameter, 7.1±1.41 cm in depth, and 3.1±0.40 kg in weight. Unused nests has 85.0±26.37 cm in outer diameter, 26.1±2.48 cm in inner diameter, 6.8±1.77 cm on depth. The incubation period was 38.3±1.66 days. Total number of eggs laid was 133, and the mean clutch size was 3.6±0.69. The size of eggs had 53.3±1.61 mm in length, 4.08±0.96 mm in width, and 43.7±1.60 g in weight. The color of the egg was light blue. The overall hatching success rate of 133 eggs was 96.5% (125 hatched eggs), and the fledgling success rate was 90.4% (120 fledged birds). Breeding failure was caused by 3 factors. Poisoning and thinning caused 25% of breeding failures respectively, and the cause of 50% of failure was unknown. During the breeding period, the female barely left the nest concentrating on incubation and brooding. The male hunted a variety of mammals, including Eurasian Red Squirrels *Sciurus vulgaris* (8%), and avian species, including Rufous Turtle Doves *Streptopelia orientalis* (28%), and fed his family around the nest. The male also incubates eggs when the female leaves the nest for a while. After 4 weeks of incubation, it is confirmed that the hunting rate on mammals was increased.

Session IV

Migration and Tracking

APPLICATION OF DOPPLER WEATHER RADAR IN STUDIES OF THE MIGRATORY PATTERN FOR CHINESE GOSHAWK AND GREY-FACED BUZZARD IN TAIWAN

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The weather condition and the uniqueness of geographical location have made Taiwan as the transit point for migratory birds or raptors; it is in the mid-point of migratory path during the spring (south-north) and autumn (north-south) migration. Indirectly, this has made Taiwan as one of the best locality to study the ecology of migratory raptors. In the past, Kenting National Park used the ground count and observation method to study on migratory raptors. Weather radar also has been used in this study; it is successfully to determine the migratory path for raptors in each case of study manually without eliminate noises, which are contributed by clouds, ocean waves, rains, helicopter and others. In this study, the main purpose is to use the weather radar to scan and capture the signal of raptors, whereas noises are captured by an all sky camera. The migratory path analysis can be carried out by eliminate noises from radar signals automatically by own developed computer software. The data collected throughout autumn migration and spring migration can be analyzed by using this method and summarize into the main migratory path of raptors. Taiwan Island having the highest density in the distribution for Doppler weather radar, therefore Doppler weather radars are applied to captured migratory raptors signals, then uses it to analyze for investigating the migratory path of East Asian migratory raptors, like Chinese Goshawk and Gray-faced Buzzard. The signals of raptors identifying from weather radar can be analyzed, during migration Chinese Goshawk and Gray-faced Buzzard queue up in a line to form a long strip and called as “Eagle River”. The migration height is within 200m to 800m; speed within 36km/hr to 54km/hr. Due to the topography of the terrain in

southern Taiwan like a funnel-shaped, therefore during raptors migrate from Siberia, Kyushu of Japan, and Korean peninsula through Taiwan to the south, these raptors will stop over and gather in Kenting of Manchou Xiang before continue their journey to the south. It is different during spring migration, the migration path can be summarized into three paths, (1) passes by Maopitou and landed Taiwan at Sheliao Village in Pingtung, (2) enter Taiwan Island at Nan Wan of Kenting, (3) from Bashi Channel flying along the Pacific Ocean Coast (East Coast of Taiwan) not entering Taiwan, continue to north. The radar signal of raptors also used to estimate the directions of raptors migration. Due to this signal of raptors will disappear when raptors entering Taiwan Island, we discovered that after raptors entering Taiwan Island, they will continue their journey along the Central Mountain Range (Chungyang Range) and migrate to the north. Another path, raptors migrate along the Pacific Ocean coast will pass by radar scanning area in Hualien and continue their journey to the north. Although this study has showed that the raptors migratory path while passing through Taiwan can be identified, but the weather radar in Taiwan only be able to capture less than 50% of the total raptors migration area. If can gather all the information of weather radar throughout the whole South East Asia, it is possible to established a radar tracking network to capture the total migratory path of raptors. The mystery of raptors migratory path can be completely known, and also help to understand the habitat of raptors in East Asian. This certainly will help to further improve the raptors conservation efforts.

APPLICATION TECHNIQUES OF DOPPLER WEATHER RADAR IN RECOGNITION OF A LARGE NUMBER OF MIGRATORY RAPTORS IN TAIWAN

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Both spring monsoon and autumn monsoon affect Taiwan and create a lot of special ecological landscape, such as the migration of Chinese Goshawk and Grey-faced Buzzard is a very special scene in the world. This also enables Taiwan to become a special location in the world for studying the ecology on migratory raptors. The purpose of this research is to develop the application technique of Doppler weather radar to detect the signals of migratory raptors. The real time analysis on weather radar echoes signals can determine whether the radar signals detected migratory raptors or not. The basic concept to develop the "Raptor Identification System" is using signal removing method to identify migratory raptors. This system removes signals which are not signals of raptors in radar echo signal, such as signals of cloud, signals of moisture and others. After remove all these signals the remaining signals are identified as signals of migrating raptors. In order to match the flying altitude (200m~800m) of migratory raptors, this identification system uses the weather radar to scan in both elevation angle of 0.5 degree and 1.4 degree to detect signals of migratory raptors. There are five steps of the raptors identification. (1) Eliminate the same signals for the simultaneous detection radar signals of different elevation angle in 0.5 degree and 1.4 degree. (2) Remove the same signal when time changing continuously (Stagnant signal). (3) Remove the moisture signal. (4) According to the raptors migration paths in spring and autumn from previous year experience to identify the possible raptors migratory paths. If the radar signals out of

these paths, it is to identify that the signals are not the signals for migratory raptors and can be removed. (5) After the above identification for the output of radar echo signal output, it will be used to intersect with radial velocity signal, so that the raptor migrate signals can be identified. When the system discovered raptor signals, the ground survey person will check whether is that any raptor transit through this location or not, this is to verify the radar echo signals are from raptors or not. When this system discovers raptor signals in radar echo graphic, the ground survey person will confirm in real time to find out is that any raptors transit through this location or not. This "Raptor Identification System" has identified a total number of 994,674 weather radar graphics since April 2009 to November 2011. Thirteen cases of a large number raptor migration signal have been identified. These successful identification cases have showed that it's feasible to apply Doppler weather radar to detect raptor migration signal during the migration season. So far this "Raptor Identification System" only use in Taiwan, if this system can cover the entire South East Asia, it will help to understand the entire raptor migration path up to South East Asia. This will help to understand the mystery of migratory path for Chinese Goshawk and Gray-Faced Buzzard, and it also can help for the enforcement of conservation to achieve the purpose of conservation during the migratory sessions.

DEVELOPMENT OF MIGRATORY RAPTORS MONITORING SYSTEM BY USING OPTICAL REMOTE SENSING METHOD

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Ground counting is the oldest and easiest method to count the population of migratory raptors. It is able to recognize the species of migratory raptors based on size, color and song and flying characteristic. However, ground counting of big flocks of migratory raptors often faces difficulties due to the raptors' mobility and size. When the size of the flocks increases, ground counters will easily duplicate their counting. Besides, ground counters will feel tired and easily lost their concentration when waiting for the migratory raptors for a long period of time. Therefore, the accuracy of this ground count method is questionable. In this study, we proposed using a remote sensor coupled with image processing technique to develop a semi automatic migratory birds' monitoring system. Digital Single Lens Reflex (DSLR) camera was used as a remote sensor is use to capture the image of the migratory raptors. The captured images are downloaded to the computer and processed by our own developed system. The development of the system is based on image processing techniques such as background subtraction based on thresholding, blob detection and noise filter. The system will analyse each image and determine the amount of the raptors appear in the photo. During the autumn migratory season of 2010, we carried out the field survey in Kenting National Park, Taiwan. We compared the efficiency and accuracy of the ground counting with our monitoring system. The study showed that the accuracy of the proposed monitoring system using DSLR camera is higher compared to the ground count method. Therefore, this system provides an efficient alternative technique for counting migratory raptors. The accuracy of the result is more promising than the traditional ground count method.

SPRING AND AUTUMN MIGRATION SURVEY AT KENTING NATIONAL PARK, TAIWAN (2009-2011)

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Kenting National Park locates in Henchun peninsula, the south tip of Taiwan, is well known as an important migration pass for raptors in Autumn. However, there is much less data on spring migration in the same area. In 2009-2011, we established full season counts for spring migration , and also monitored the raptor migration in Autumn. For Spring migration, 33,479-47,484 raptors of 17 species were recorded in 3 years. The Chinese Goshawk (*Accipiter soloensis*) was the most abundant species, maximum record of year is 36,570 individuals in 2011. Migration period is 11 days on average, between mid April to early May, with daily peaks at 5-8 AM and 4-6 PM. The second numerous species was the Grey-faced Buzzard (*Butastur indicus*). Its maximum record of year was 16,841 individuals in 2010. Migration period lasted 13 days on average, from Mid to late March, with daily peak at 10 AM to 2 PM. For autumn migration, The Chinese Goshawk was the most abundant species, with maximum record of 140,029 individuals in 2010. Migration period lasted about 31 days on average, from Mid September to early October, with daily peak is 6-8 AM. Followed by the Grey-faced Buzzard, with a maximum record of 49,608 individuals in 2009. Migration period lasted about 13 days on average in mid October, with daily peak at 5-7 AM. Our results showed there were stable migratory raptor populations passing through Kenting National Park in autumn and in spring. However, the spring migration routes and roost sites were changeable, perhaps due to variations in regional weather conditions of the time.

ABUNDANCE AND MIGRATION TIMING OF ORIENTAL HONEY-BUZZARD: FIVE YEARS OF RAPTOR COUNTS AT TANJUNG TUAN, PENINSULAR MALAYSIA

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Tanjung Tuan (2° 24.4' N; 101° 55.3' E) is an important raptor migration watchsite in Peninsular Malaysia as it provides the shortest distance for the birds to move across the Straits of Malacca between Sumatra (Indonesia) and Malaysia. This site is also internationally recognized as an Important Bird Area (IBA) for Malaysia. We examined the abundance and migration timing of Oriental Honey-buzzard (*Pernis ptilorhynchus*), the most abundant species recorded there, based on the annual standardized counts made at Tanjung Tuan between February-April in 2006-2010. The highest number of birds was counted in 2008 with an average of 1,813.89±308.53 (SE) individuals per day whereas the lowest was 309.64±47.97 (SE) birds recorded in 2009. There were significant differences in bird counts over the five years (ANOVA $F_{4,129}$=14.648, P<0.001). The reasons behind this remain unknown, although we suspect that this could be associated with the change in wind direction and/or extreme weather during a particular year. No clear associations were observed between bird abundances and microclimate data collected during migration counts. From observations made in each year, daily migration started at 0900 hrs and ended at 1700 hrs. Except for 2008, the peak of migration for all other years occurred between 1100 hrs and 1300 hrs. We recommend the continuation of consistent monitoring of migratory raptors at

Tanjung Tuan and strengthening collaborations with other raptor migration watchsites along the flyway through sharing of data and monitoring experiences.

MIGRATION OF RAPTORS ON ISLANDS IN THE SOUTH-WESTERN PART OF KOREA

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We have monitored the migration status of raptors passing through two islands located in the south western part of Korea (Heuksando: N 34° 41′, E 125° 11′; Hongdo: N 34° 41′, E 125° 25′) from 2006 to 2011. From the monitoring, a total of 21 migratory diurnal raptor species were counted. The Chinese Sparrowhawk *Accipiter soloensis* was the most abundant species with the highest counting record of 363 individuals in a day. The Grey-faced Buzzard *Butastur indicus* and the Oriental Honey Buzzard *Pernis ptilorhynchus* were the next abundant species with records of 220 and 191 individuals per day, respectively. The number of individuals of Chinese Sparrowhawks showed a distinct tendency of increase in early and mid May. Grey-faced Buzzards and Oriental Honey Buzzards were seen in autumn rather than in spring; massive flocks of Grey-faced Buzzards were observed in early October, and Oriental Honey Buzzards were observed in late September to early October. Given the migration patterns proved by previous studies on Grey-faced Buzzards and Oriental Honey Buzzards in Korea, our study confirms that the south-western coastal part of Korea is the important autumn migration route of the two species. All these results also suggest that those three major raptors have elliptical migration strategies using two different routes when they migrate into and out of Korea. Because many of raptors recorded in Korea are protected species in and out of Korea, long-term and concentrated researches are needed on the area of the major passage of the raptors.

THE WINTER DISTRIBUTION AND MIGRATION OF BREEDING PEREGRINES (*Falco peregrinus*) FROM THE LENA DELTA, RUSSIA

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We fitted satellite transmitters to eight adult female Peregrine Falcons breeding in the Lena Delta, Yakutia, Russia in June 2010 and tracked their subsequent migrations (two autumn and one spring migration) via the Argos system. The birds established winter ranges in China, Thailand and the Andaman Islands and remained faithful to these ranges in consecutive winters. The average great circle distance between breeding and wintering ranges was 5,470 km, with migratory pathway distances ranging from 4,400 km to 7,640 km. We provide information on timing, routes and speed of travel during the migrations and discuss the ranging behaviour and ecology of the birds during winter in south-east Asia.

CINEREOUS VULTURE *Aegypius monachus* TRACKING BY USING NEWLY INVENTED GCT-B1 (GPS CDMA BASED TELEMETRY)

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In order to identify the migration route and daily activity of Cinereous Vulture *Aegypius monachus* we are using the GCT-B1, a newly invented telemetry device by the Korea Institute of Environmental Ecology. The GCT-B1 is a new telemetry device based on the GPS (Global Positioning System) combined with CDMA (Code Division Multiple Access) mobile phone system. This device when attached on wild animals will record the GPS coordinates at a given time interval and transmit the geographic coordinates at the pre-setting time of day using the public network of mobile phone system. Researchers can acquire the migration routes of wildlife at WEB. During the winter of 2011-12, we attached a GCT-B1 on a captured Cinereous Vulture and it will be five in total to study their wintering behavior.

Session V

Status, Conservation and Management

POPULATION ECOLOGY OF MIGRATORY VULTURES AT JORBEER AREA, BIKANER (RAJASTHAN), INDIA

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Out of nine species of vultures found in India (Ali and Repley, 1987). Seven species have been observed at Jorbeer area, Bikaner (Rajasthan), India during the winters. The Bikaner district of Rajasthan is western part of the "Thar" desert. The Thar desert is known for extreme desertic conditions where the temperature reaches 49.50℃ high and minimum -1℃ to -2℃, low annual rainfall, the vegetation of this region is thorny and scanty, strong dust storms and shifting dunes are the main features of this desert area. Seven species of vultures were recorded during long term study, April 2006 to March 2010, viz the King Vulture (*Sacogyps calvus*), Cinereous Vulture (*Aegypius monachus*), Egyptian Vulture (*Neophron percnopterus*), Eurasian Griffon Vulture (*Gyps fulvus*), Himalayan Griffon Vulture (*Gyps himalayensis*), Long-billed Vulture (*Gyps indicus*) and White-backed Vulture (*Gyps bengalensis*). Most of the vultures at Jorbeer are winter migratory, only Egyptian vultures are resident vultures. The population of vultures starts increasing from October to January and decreasing in February to March. The maximum population observed in the months of December, January and February. The maximum of 5338 vultures belonging to seven species were recorded in five years of study period. The overall population of vultures shows increasing trend. The vulture population showing increasing trends are Cinereous Vultures, Egyptian Vultures, Eurasian Griffon Vultures, and Himalayan Griffon Vultures. King Vultures, White-backed Vultures and Long-billed Vultures are stable in their population. Nesting has not been observed at Jorbeer. There are some studies suggest that Diclofenac (a medication used to treat inflammation and pain) is the main cause of the vultures decline but during study period I have not recorded any data

regarding this hypothesis and found several other factors responsible for vulture mortality like habitat loss, accidents, predation by feral dogs, general decline in the number of old and mature tress, Nesting tree availability, and human population pressure. Detailed investigation for the cause of vulture population decline like Pilot survey of vultures all over the country, protection of potential breeding sites and mature trees, attempts to detect a possible pathogen, determination of pesticide load in vulture and its food are suggested for conservation of vultures.

THREATENED STATUS OF DIURNAL RAPTORS IN INDONESIA AND ITS CONSERVATION CHALLENGES

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Indonesia is a tropical archipelago of c. 17,000 islands with a total land surface area equal to 1,910,931 km^2, and is regarded as one of 12 world's mega-biodiversity countries. Straddling Wallace's Line, its fauna and flora have both Asian and Australian components, and its avifauna comprising 17% of the world's total number of birds (c. 1600 species). Indonesia is also among the top countries for Endemic Bird Areas (EBA). Depend on the taxonomy followed, diurnal raptors are represented by 68-76 species, 10-16 of which are endemics. Indonesia is also a wintering area for 42 species that migrate from the Northern hemisphere, mainly China and Japan. Sadly, however, rampant deforestation, illegal trade, high levels of corruption, and lack of law enforcement, and illegal trade has led to Indonesia having more threatened species than anywhere else in the world. Among the diurnal raptors, two are considered Critically Endangered (Flores Hawk-eagle *Nisaetus floris*; IUCN 2011, Bawean Serpent-eagle *Spilornis baweanus*; Global Raptor Information Network 2011), one Endangered (Javan Hawk-eagle *Nisaetus bartelsi*; IUCN 2011), and four Vulnerable (New Guinea Harpy Eagle *Harpyopsis novaeguineae*, Wallace's Hawk-eagle *Spizaetus nanus*, Greater Spotted Eagle *Aquila clanga*), and Mountain Serpent Eagle *Spilornis kinabaluensis*; BirdLife 2003, IUCN 2011). This paper will describe the current status of the diurnal raptors in Indonesia and discuss the conservation challenges they pose and propose conservation strategies through local and global involvement, capacity building, and provision of basic conservation tools and action plan like field guide and recovery plan).

Keywords: diurnal raptor, endemic, IUCN, conservation status

DISTRIBUTION, POPULATION, HABITATS AND ECOLOGICAL ASPECT OF FLORES HAWK EAGLE (*Nisaetus floris*) IN AND AROUND LOMBOK ISLAND, WEST NUSA TENGGARA, INDONESIA

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The Flores Hawk Eagle *Nisaetus floris* belongs to the Hawk Eagle family and being endemic to Nusa Tenggara Islands. The species has been qualified as Critically Endangered by IUCN (2005) under criteria C1 (population <250 individuals and continuing to decline 10% per 10 years or three generations). This paper presents results of study during dry season (July and September 2011) with the main objective is to collect data of distribution, population, habitats and ecological aspect of the species inhabiting conservation areas and other protected areas in and around Lombok Island, West Nusa Tenggara. The total population found during the survey were 44 individuals (22 pairs and 2 floaters) on 18 locations. The Flores Hawk Eagle commonly occurs at elevation of >900 m about sea level (sub-Montana forest zone) while lower elevation of <900 m a.s.l., is more dominated by Brahminy Kite *Haliastus indus*. Among the most serious threat to the survival of the eagle are land use change, shifting cultivation, hunting practice by local community, and collection of firewood and wood material for building and forest clearance agriculture.

Keywords: Flores Hawk Eagle, *Nisaetus floris*, population, distribution, habitat, threat

A SURVEY OF WHITE-RUMPED FALCON AND COLLARED FALCONET IN DIPTEROCARP FOREST, THAILAND

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The objectives of this survey were to study the abundance of White-rumped Falcon (*Polihierax insignis*) and Collared Falconet (*Microhierax caerulescens*) in dipterocarp forest of 3 protected areas and to enhance the participation of birders in scientific data collection. The raptors were surveyed by the roadside survey method along the nature trails and there were forty-five birders participated in the survey. The survey data was analyzed by conducting abundance index. The results revealed that the abundance of White-rumped Falcon in Huai Kha Khaeng Wildlife Sanctuary and Sub-sadao Park Ranger Unit, Thap Larn National Park were 0.29 and 0.13 birds per kilometer, respectively but we did not find White-rumped Falcon in Toongkik Park Ranger Unit, Mae Ping National Park. Furthermore, there were Collared Falconet 0.39 birds per kilometer in Sub-sadao Park Ranger Unit and 0.14 birds per kilometer in Huai Kha Khaeng Wildlife Sanctuary and Toongkik Park Ranger Unit.

Keywords: abundance, Collared Falconet (*Microhierax caerulescens*), White-rumped Falcon (*Polihierax insignis*)

RATIO AND DISTRIBUTION OF LONG-CRESTED MOUNTAIN HAWK-EAGLE IN TAIWAN

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The Mountain Hawk-eagle in Taiwan was sorted to nominate subspecies (*Nisaetus nipalensis nipalensis*). The same subspecies in Himalayas has long crests on its head. But this subspecies in Taiwan was generally thought to have short crests, which is more similar to Japanese subspecies (*N. n. orientalis*). In the past decade, there have been several long-crested individuals discovered in Taiwan. In order to understand the ratio and distribution of long-crested Mountain Hawk-eagle in Taiwan, we checked banding records, specimens and field photos from bird watchers. The time and location where the photos were taken would be checked to avoid repetitive count of the same individual. Plumage and iris colors were used to determine age. We collected data from 47 individuals, with 78.7% from breeding observation, field photos and banding records, and the rest from specimens and captive birds. Two individuals were specimens from the 1980s, the others were after 2000. We found 13 (27.7%) individuals with one or several white-ended black feathers on the head, just like long crests. Eight of the 13 individuals have one black feather and the rest have 2-4 feathers. Lengths in nine of which were estimated to be over 4 cm and up to 10 cm. The other four were 2-4 cm long and may be neglected when observing in the field. The typical short-crested individuals don't have these black feathers. The long-crested individuals were distributed all over Central Mountain Range of Taiwan. Nine of them were nestlings or immature, and three were young adults. Of the seven birds which were sexual identifiable, five of which were males. We found a nest with a short-crested male and a 2-cm-crested female, and their fledgling had a 4-cm long crest when fledged. So crest types were

different between parents and young. The aborigines in southern Taiwan wear Mountain Hawk-Eagle primaries in tradition, and some hunters indicated their grandfather had captured long-crested individuals (around the 1950s) several times. They gave the name “King of Eagles” to those rare individuals. So we believe the diversity in Mountain Hawk-eagle’s crests in Taiwan has existed for a long time.

GAP ANALYSIS IN JAVAN HAWK-EAGLE (*Spizaetus bartelsi*) CONSERVATION

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A management approach to conserve the Endangered Javan Hawk-Eagle (*Spizaetus bartelsi*) which is different from the already existing conservation approach, has been studied. The study had been conducted since December 2009 to February 2010 in Gede-Pangrango National Park, Telaga Warna Nature Reserve, and its surrounding forested areas. All study areas are in West Java. The objectives of the study are: 1) to identify stakeholders closely related to the Javan Hawk-Eagle conservation efforts, 2) to identify relevant regulation related to the Javan Hawk-Eagle conservation efforts, 3) to understand the stakeholders performance in relation to the Javan Hawk-Eagle conservation efforts, 4) to find out the possible gaps in conservation efforts of the species, and 5) to identify factors causing the gap. Primary data were collected using in-depth interview and field observation while secondary data were collected through study of relevant references. Stakeholders were identified through snowball method. I conducted spatial analysis, stakeholder identification analysis, content analysis, and gap analysis. Results of the study recognized two conservation management approaches: 1) species level and 2) habitat level. These approaches will effectively conserve the existing fragmented and less protected forest blocks as well as boosting the

participation and synergism of many stakeholders. Further, by using this approach, a gap in conservation management among local conservation agencies will also be discussed for the benefit of the Javan Hawk-Eagle in particular and for biodiversity in general.

Keywords: conservation, gap analysis, Javan Hawk-Eagle, management

A RETROSPECTIVE STUDY OF MORBIDITY AND MORTALITY OF RAPTORS IN KASETSART UNIVERSITY RAPTOR REHABILITATION UNIT, 2008-2011

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Retrospective study on 111 raptors received rehabilitation was conducted during 2008-2011 at Kasetsart University Raptor Rehabilitation Unit (KURU), Faculty of Veterinary Medicine, Kasetsart University. Twenty-seven species were admitted, and comprised taxa in Falconiformes (73 individuals), and Strigiformes (38 individuals). The morbidity and mortality causes were identified as trauma (38.74 %), orphaned young (19.82 %), starvation (17.12 %), infectious diseases (13.51 %), metabolic bone diseases (4.50 %) and other (6.31 %). After treatment, 40.54 % of the raptors were cured and able for release back to the wild, 29.73 % deceased, 19.82 % are being rehabed at the time of writing, 9.91 % were kept in captivity. Trauma appears to be the predominant cause of morbidity and mortality for rehabilitated raptors in the unit.

Keywords: morbidity and mortality, raptor, retrospective study

VOLCANO'S IMPACT TO THE RAPTOR AT MOUNT MERAPI

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From the 50 of Indonesian national parks, Mount Merapi National Park is one of the 11 mountainy National Parks and become one of the active volcano with Bromo Tengger Semeru National Park. The mountain supports 160 species of birds, including 6 species of raptors, and is also one of migration routes and roosting sites of raptors that migrated from Northern part of Asia. Migratory raptor species that possibly cross this mountain are Oriental Honey Buzzard (*Pernis ptylorhynchus orientalis*), Chinese Goshawk (*Accipiter soloensis*), Japanese Sparrowhawk (*Accipiter gularis*) and Peregrine Falcon (*Falco peregrinus*). On 25 October 2010, Merapi was erupted destroying more than 5263 hectare (82%) of the National Park area. For more than 3 months, 150 millions m^3 sand and volcanic material came out of the mountain. We took observation from 28 October 2010 to 23 April 2011 at four tracks in southern slope, including Turgo Hill, Gua Jepang (Japan's Cave), Plawangan Hill and Kinahrejo-Bebeng. During the earlier three months of the survey, observations were often suspended due to safety reasons and prioritized works such as people evacuation and food distribution for the evacuee. More constant observations were possible after February 2011. As a result of the six months of observation, we identified seven species of raptors, including three migratory raptors: Oriental Honey Buzzard (*Pernis ptylorhynchus orientalis*), Chinese Goshawk (*Accipiter soloensis*) and Japanese Sparrowhawk (*Accipiter gularis*). We also noted that Javan Hawk-eagle (*Spizaetus bartelsi*) and Black Eagle (*Ictinaetus malayensis*) have moved from Kinahrejo into Plawangan and Turgo Hill.

SPATIAL ANALYSIS OF RARE AND THREATENED RAPTORS DIVERSITY: EMPIRICAL BASE FOR ESTABLISHING CONCEPTUAL PLAN AND POLICY GUIDANCE IN BIODIVERSITY CONSERVATION

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Breeding period is a critical phase for raptors that at present are categorized as rare and threatened species. In relation to this, a spatial analysis has been undertaken to assess the relationship between landscape structure and raptors nesting sites in the landscape of Panaruban West Java, Indonesia. The result suggests that the landscape of Panaruban is a mosaic consisting of natural and artificial vegetation of different structure. Such combination has resulted in high landscape heterogeneity that accommodates four species of raptors to co-exist in Panaruban landscape. The four raptor species tend to build their nests in places with various topographical conditions. They tend to select nesting site that has low degree of landscape contrast. In general, landscape heterogeneity around nesting sites appears to be similar. On the other hand, landscape connectivity within these sites is to some extent exhibit a difference. However, in terms of landscape complexity, there is no great difference among the nesting sites.

Keywords: landscape, nesting site, raptors, spatial analysis

UNEP/CMS RAPTORS MOU

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The Memorandum of Understanding (MoU) on the Conservation of Migratory Birds of Prey in Africa and Eurasia is an international agreement under the auspices of the Convention on Migratory Species. The MoU concerns migratory populations of Falconiformes (eagles, hawks, falcons and vultures) and Strigiformes (owls) species occurring in Africa and Eurasia, which encompasses a total of 130 political states and territories. The Environment Agency - Abu Dhabi generously funds and hosts an Interim Coordinating Unit based in the UAE. The MoU came into force on 1 November 2008 and has already been signed by 38 States and 2 collaborating Partner organizations. The first meeting of the Signatory States is planned to take place in late 2012. Raptors are important biological indicators: fluctuations in their populations can reflect the health, or otherwise, of the environments in which they live. Birds of prey require interconnected networks of suitable habitats for breeding, migration and overwintering. Migratory species are particularly vulnerable to risk due to natural factors and to interactions with man. Due to the relatively slow reproductive rates in birds of prey, recovery from population losses can take a long time. The Raptors MoU is implemented via an Action Plan that promotes an internationally co-ordinated approach to the conservation of African-Eurasian birds of prey, with the overall aim being to return and maintain these species in Favourable Conservation Status. The presentation will provide an overview of the development of this relatively new international agreement and will highlight the conservation opportunities it presents for the future.

Session VI

Diet/Habitat Use and Other Topics

HABITAT AND FOOD NICHE OVERLAP AND PARTITIONING IN FIVE SPECIES OF OWLS FROM WESTERN MAHARASHTRA, INDIA

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Five species of owls belonging to the Family Tytonidae (Barn Owl *Tyto alba*) and the Family Strigidae (Indian Eagle Owl *Bubo bengalensis*, Brown Fish Owl *Bubo zeylonenis*, Mottled Wood Owl *Strix leptogramica*, and Spotted Owlet *Athene brama*), co-inhabiting the Deccan Plateau and coastal region of Kokan in Western Maharashtra, India, were studied for the first time to understand habitat and food niche partitioning. We recorded their habitat preferences and food habits from 2005 till 2008. We studied the habitat wise niche overlap and partitioning based on Discriminant Factor Analysis (DFA) and food wise niche overlap and portioning based on Pianka Niche Overlap Index (PNOI) and Principle Component Analysis (PCA). The Spotted Owlets and Indian Eagle Owls had the most compact habitat clusters indicating a more specific habitat requirement, namely scrubs and grasslands, than the Mottled Wood Owls, which prefer deciduous forests and grooves. While, Barn Owls and Brown Fish Owls occupy more diverse habitats, the latter preferred more water bodies and evergreen forests in their habitat. Dendrogram based on PNOI suggested that Spotted Owlets and Indian Eagle Owls had maximum food overlap in terms of mammalian, avian, reptilian and insect prey, followed by Barn Owls and Mottled Wood Owls. Brown Fish Owls had the least overlap with other owls in food preference because they took fish and aquatic invertebrates. Even though Spotted Owlets and Indian Eagle Owls had maximum overlap in both habitat preference and PNOI, PCA for the food preference suggested that food partitioned these two species based on both the frequency and biomass of the prey type, indicating food niche partitioning. While both these species had overlapping prey species in

the diet, Spotted Owlets preferred smaller food items, like insects, arachnids, millipedes and reptiles, to larger ones, with more abundance in terms of frequency and biomass, as compared to the Indian Eagle Owls, who preferred rodents, insectivores, bats, birds, carnivores and lagomorphs, and it could be attributed to the size difference between these two owl species. On the other hand, both Mottled Wood Owls and Barn Owls were generalist feeders without specific food preference, and though they had a particularly high niche overlap they had relatively less overlap in terms of the habitat preference.

THE VARIATION OF DIET COMPOSITION OF EAGLE OWLS IN RELATION TO HABITAT TYPES IN KOREA

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The diet composition of Eagle Owls (*Bubo bubo*) were studied in 4 different habitat types (forest, agriculture, wetland and mixed habitat types). For this purpose, we analyzed 1,460 prey items obtained from 924 pellets and 536 prey remains of 34 territories in the midwest areas of Korea during the breeding season of 2010-2011. The diet analyses of Eagle Owls showed that 53.6% of the number of diet items was mammals but 72.4% of the total biomass of diet was birds. The Brown Rat (*Rattus norvegius*) was the most common prey in agriculture and mixed habitat types, whereas the Rufous Turtle Dove (*Streptopelia orientalis*) was the most common in forest and wetland types. The estimated mean mass of prey was 300.2 ± 361.9g, but the mean masses were significantly different in 4 different habitat types. The mean biomass of wetland habitat type was 2 times higher than that of mixed habitat type. Ring-necked Pheasants (*Phasianus colchicus*) and birds belonging to the Anatidae such as Spot-billed Ducks (*Anas pecilorhyncha*), Common Teals (*Anas crecca*) and Mallards (*Anas platyrhynchos*) account for 59.4% of diet biomass in wetland habitat type, whereas mammals belonging to the Muridae such as Brown Rats, Striped Field Mice (*Apodemus agrarius*) and voles (*Clethrionomys* spp.) account for 29.5% of diet biomass in agricultural habitat type and 35.4% of diet biomass in mixed habitat type. The food-niche breadth (dietary diversity estimated by $1/\sum pi^2$) was 5.49 ± 2.87 (at individual nests), reaching the peak point of 9.36 in wetland habitat type and the lowest point of 3.41 in mixed habitat type. The prey taken by Eagle Owls were significantly correlated with the general habitat type in which the nests were

located, and the owls took the larger and more diverse prey in wetland habitat type than others.

Keywords: Eagle Owl *Bubo bubo*, diet, pellet, habitat, biomass, food niche breadth

PRELIMINARY RESULTS OF NESTING BEHAVIOUR AND SITE PREFERENCE OF AMUR FALCONS (*Falco amurensis*) IN MONGOLIA

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As human populations increasingly encroach on important habitats, it is critical to assess the impact of humans on species that use these habitats and to establish a baseline for future comparison. While the transoceanic migration patterns of Amur Falcons (*Falco amurensis*) have been extensively studied in China and South Africa, the hatching, developing, and fledging behaviours of the species are still unknown for breeding territories. From 16 July, 2011 to 18 August, 2011, we collected data on breeding ecology and behaviours of Amur Falcons at Hustai National Park, Mongolia. The data was divided into three distinct subsets: chick growth, time budgets of the entire family, and nest characteristics measurements. We also took photographs of the chicks at various stages in their development in order to construct a timeline of physical development. During July, we located 60 nests, of which 11 were currently occupied. On average, each of the nests contained four eggs, and of the total 40 Amur Falcon chicks, 90% hatched successfully and 85% fledged. This may be attributed to a high availability of prey, a low density of predators, or other environmental factors. Through human interactions with the falcons, we found that though the parent birds are stressed by human presence, they are not sensitive enough that they would abandon their nests. Through time budget data, we found that hunting is predominantly the males' responsibility while the females are usually the parent that feeds the chicks. Both parents are responsible for defending the nest against threats such as Black Kites (*Milvus migrans*), Saker Falcons (*Falco cherrug*), Steppe Eagles (*Aquila nipalensis*), as well as other Amur Falcons. Preliminary analysis of the time budget data indicate that this species is most active, hunting, during midmorning and mid-afternoon. During inclement weather, such as excessive

heat or rain, the birds are more likely to be found perching or preening, either in the nest tree, or a nearby tree. Thus far, we have found no significant differences in parental behaviour with respect to number of eggs, though parental feeding decreased as the chicks became older and parents of some nests in close proximity to other nests spent a greater amount of time defending the nest than parents of more isolated nests. Analysis of the nest characteristic data indicates that Amur Falcons are secondary nesters, taking advantage of Black-billed Magpie (*Pica pica*) nests, frequently in birch and poplar trees, that are unused or have been forcibly vacated. Our preliminary analysis indicates that tree height, nest height, and size of the nest (internal and external height and diameter) are not significantly different between occupied and empty nests. The results of this study will enable researchers to focus the scope of future projects as well as compare new research with previous studies in order to evaluate changes in the breeding ecology of Amur Falcons.

CORE AND EDGE HABITAT CHARACTERISTIC OF ORIENTAL HONEY BUZZARD (*Pernis ptilorhynchus*) WINTERING IN SOUTH KALIMANTAN BASED ON SATELLITE TRACKING

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The Oriental Honey Buzzards (*Pernis ptilorhynchus*) is one of migratory raptor that has wintering habitat in Indonesia. The wintering habitat was distributed into a core habitat and an edge habitat. Both habitats are considered have their own landscape characteristics, which influence Oriental Honey Buzzards (OHBs) to select it as wintering site. The purpose of this research is to define and compare landscape characteristics in both core and edge habitats. Principal Component Analysis (PCA) and Geographical Information System (GIS) were used as a tool for analyzing 21 environmental variables which extracted from elevation, slope, and land cover map. The results of this study are defined by seven principal components (PCs) and eight PCs, which are explained by 76.2% and 76.7% of the data variance in landscape characteristics of core and edge habitats, respectively. PC1, PC2, and PC5 have been interpreted as main characteristics which can be found in both habitats, while the rest PCs are different. PC1 is related to a terrain characteristic which is characterized by an elevation more than 300 meters above sea level and the nearest distance to dry-land forest. PC2 is related to terrain characteristics which are characterized by semi-plain areas (3-8% slope) and undulating areas (8-15% slope). PC5 is related to the nearest distance to peat swamp forest. Results of this study are really useful as important information for developing the wintering habitat management plan of OHBs. We recommend that habitat management plan in core and habitat must be developed based on their specific habitat characteristics.

Keywords: geographical information system, landscape ecology, *Pernis ptilorhynchus*, principal component analysis, wintering habitat

COMMUNITY CHANGES OF THE WINTERING RAPTOR SPECIES ACCORDING TO THE AGRICULTURAL LANDSCAPE CHANGE

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This study was conducted to investigate changes in raptor communities of the Civilian Control Zone (CCZ: N 38° 10′~19′, E 127° 04′~26′), which is the near Demilitarized Zone (DMZ) in Cheorwon, Korea. An analysis was conducted on data that were collected 4 times a year between December and February from December 2001 to February 2011. We are classified Land cover type by using Maximum Likelihood Classification method of the LANDSAT satellite imagery of May 2003 and October 2008. Cropland and built-up area have been increased from 2003 to 2008 in the CCZ area. However, forest and riparian area have been decreased. Number of wintering raptor species have been decreased from 2001 to 2011. Cinereous Vulture Aegypius monachus populations experienced significant fluctuations, which were strongly related to changes in the intensity of artificial feeding. In particular, the abundance of Cinereous Vultures tended to decrease as artificial feeding decreased; decreases in artificial feeding were a preventive measure to address concerns regarding the occurrence of infectious diseases, such as avian influenza and foot and mouth disease. Except for Cinereous Vultures, raptors have decreased for the past ten years in all community indices, such as the number of species ($r=-0.74$, $p<0.05$), species diversity ($r=-0.76$, $p<0.05$), species richness ($r=-0.62$, $p=0.056$), and species evenness ($r=-0.67$, $p<0.05$). Such a drop in the raptor indices is possibly due to a decrease in area in the CCZ, increasing residential area, agricultural intensification, and decreasing natural areas.

THESIS RESEARCH FOCUSING ON RAPTORS IN TAIWAN

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This article reviews graduate school theses using raptors as topics in Taiwan between 1999 and 2011. This review includes 33 master's theses and 2 doctoral dissertations and highlights the increasing research interests in raptors. Only 6 of the research were related to social sciences or humanities, whereas most of the authors were in life sciences or veterinary medicine. Totally 19 species were studied but Crested Serpent-Eagle (*Spilornis cheela*), Gray-faced Buzzard (*Butastur indicus*), and Collared Scops-Owl (*Otus lettia*) have drawn the most attention. The majority of research on raptors focused on distribution and habitat, followed by diet and foraging behavior. Hengchun Peninsula of Pingtung County, Baguashan of Changhua County, and Taitung County were the main study areas. Among the 13 universities, National Pingtung University of Science and Technology, which published 12 theses on raptor studies, is the most prolific institution in this topic.

MORPHOLOGICAL MEASUREMENTS OF AUSTRALASIAN GRASS-OWL (*Tyto longimembris*) IN TAIWAN

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Australasian Grass-Owl (AGO, *Tyto longimembris*) is classified as an endangered species in Taiwan. Since 1993, the Wildlife First Aid Station of Endemic Species Research Institute launched a reproduction program of AGO. Eighteen AGOs of including 12 females and 6 males aged from first to over seventh year were reproduced. During annual physical exam, body weight, bill, total head, tarsus, tail, and unflattened wing were measured. Averages of all variables of females were larger than males. The *t*-test results showed significant differences in body weights, bill lengths and tail lengths between females and males. Mean body weights of females were 531.75±31g (SD) and males were 460.17±24.13g. Facial discs of first year AGOs were sorrel and of over seventh year AGOs were white. Black spots of bellies and underwing coverts of first year AGOs were big and rich, and which of over seventh year AGOs were less even nil. Intermediate ages were difficult to distinguish their colors of facial discs and blacks spots of bellies. This study provided preliminary morphological references of AGO.

Keywords: Grass-Owl, *Tyto longimembris*, morphological measurements, sex, age

Poster Presentation

STATUS OF RAPTORS AND OWLS IN BELUM-TEMENGOR FOREST, PENINSULAR MALAYSIA

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Belum-Temengor Forest is located in north-west Peninsular Malaysia. The area consists of about 2,660 km^2 of Sundaic lowland and hill dipterocarp forests with elevations rising up to 1500 m. Parts of the area have been inundated by dam construction to form the dendritic Temengor Lake. This vast trans-boundary wilderness area is contiguous with Hala-Bala Wildlife Sanctuary and Bang Lang National Park in southern Thailand. Belum-Temengor Forest is recognized as an Important Bird Area (IBA) for Malaysia on account of its high biodiversity, including at least 274 species of birds. At present, knowledge about the birds of the area is mostly focused on hornbills, with limited information available on other bird species, including raptors and owls. We present here the current status of the raptors and owls of Belum-Temengor Forest based on field observations from 2004-2010 and on published and unpublished reports from various sources. Twenty species of Accipitriformes, four species of Falconiformes and eight species of Strigiformes have been recorded in Belum-Temengor Forest. The area supports three globally-threatened raptors: Lesser Fish-Eagle *Ichthyophaga humilis*, Grey-headed Fish-Eagle *Ichthyophaga ichthyaetus* and Wallace's Hawk-Eagle *Spizaetus nanus*. Species accounts are presented on all raptors and owls found in Belum-Temengor forest.

Keywords: raptors, owls, Belum-Temengor Forest

DISTRIBUTION AND POPULATION OF JAVAN HAWK EAGLE (*Spizaetus bartelsi* Stresemann, 1924) IN FORESTED AREA ALONG PEKALONGAN REGENCY, CENTRAL JAVA

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Locality records of Javan Hawk Eagle (*Spizaetus bartelsi*) are not only in protected area (conservation area) but also recorded in non-conservation area. One of non-conservation area were Javan Hawk-Eagle present is on forested area along Pekalongan Regency that included into Dieng Highland. The study was conducted from April to August 2011 to carry out the current condition of the population and spatial distribution of this species on this kind of area. Total size of study was covered approximately on 17595.63 hectare contained with 7579.8 hectare forested area, 9193.41 hectare cultivation forest, 4244.28 hectare plantation and remain area was local people settlements, paddy fields and cultivation. Field observation was conducted in six potential locations along forested area to carry out the existence of this species and direct threats to this species. Semi-structure interviews among local people surrounded area conducted to know public awareness and knowledge on this species. From six potential locations, the Javan Hawk Eagle is only recorded in four locations: Jolotigo, Tinalum, Linggoasri and Mendolo. The number of populations of this species in this area has been estimated approximately on 9-11 individuals or 3-4 pairs in this study area. However, the population of this species in non-conservation area has been more risk due to heavy disturbance from habitat destruction for plantation and cultivation, hunting and poaching for wildlife trade cause there are no control or attentions from the authority (forest rangers). Moreover, local people surrounding the area are less concern to the important values of this species and habitat conservations.

Keywords: Javan Hawk Eagle, unprotected forest area, population risk and public awareness

HABITAT ASSESSMENT FOR RELEASING JAVAN HAWK EAGLE (*Nisaetus bartelsi*) IN SALAK MOUNTAIN, GUNUNG HALIMUN SALAK NATIONAL PARK, WEST JAVA, INDONESIA

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Salak Mountain is including in Gunung Halimun Salak NP area. This is one of the largest national parks with tropical rain forest in Java with coverage 113,357 Hectares. The area has high biodiversities potential and important as natural habitat for many species plant and animals including Javan Hawk Eagle population. This area also has potential location for release program of confiscated raptors that become re-population of this species in this area. In 2004, we initiated to release a confiscated Javan Hawk-Eagle in this area by conducted habitat assessment on this potential location. The objectives of this project are: 1) to collect data about population and distribution of Javan hawk eagle and other species in the study area, 2) to increase a public awareness and involvement on conservation effort of raptor and its habitat, and 3) to determine of potential location for release rehabilitated Javan Hawk Eagle. This assessment was carried out a recommendation for release program of confiscated Javan Hawk-Eagle based on this study, are; 1) Estimation of Javan Hawk Eagle population in Salak Mountain area is about 17-26 individuals. 2) There are 4 suitable potential sites for releasing Javan Hawk Eagle in Salak Mountain. There are Tugu Jaya, Tanjung Sari, Cipelang and Ciputri. 3) Diurnal raptor found in Salak Mountain is Javan Hawk Eagle (*Nisaetus barteelsi*), Indian Black Eagle (*Ichtynaetus malayensis*), Changeable Hawk Eagle (*Nisaetus cirrhatus*), Oriental Honey Buzzard (*Pernis ptilorhynchus*), Crested Goshawk (*Accipiter trivirgatus*), Spotted Kestrel (*Falco moluccensis*), Australian Kestrel

(*Falco cenchroides*), Crested Serpent Eagle (*Spilornis cheela*), and unidentified raptor. 4) Habitat changes, hunting and pesticide uses is the threats of Javan Hawk Eagle and other raptors in the nature. 5) Some of local communities understood of important role of raptor in the nature, but some of them still need to socialization and awareness.

Keywords: Mount Salak, habitat assessment, confiscated Javan Hawk-Eagle, release program

IMPORTANT VALUE OF RUPAT ISLAND FOR MIGRATORY RAPTORS IN EAST ASIA

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Indonesia is one of important sites for several migratory raptors in Asia as migration route, stop over and wintering area. The migratory raptors migrate through Indonesian archipelagos with differences pathway corridors or migration routes. One of migration route or pathway corridor is Rupat Island; this island could be the most important crossing point from and/or to Indonesian archipelagos. However, very little is known about the functional importance of Rupat to their migration. At a minimum, the island functions as a vital source for thermal uplifts for raptors that prefer to use thermals for passive long distance travel. The most important region of the Rupat Island is the northern tip where migratory birds first hit land. Interior forest regions may also be important for roosting habitats though this suggestion requires further investigation. According to Lim KC *et al.* (2009) total of 7,270 raptors which 99.8% of which were OHBs recorded in Rupat Island on 2-6 March 2009. This indicated that Rupat Island has important value for migratory raptors in East Asia. Other species have been crossing over Rupat Island are Black Baza *Aviceda leuphotes* (IUCN LC); Chinese Goshawk *Accipiter soloensis* (IUCN LC); Grey-faced Buzzard *Butastur indicus* (IUCN LC); Japanese Sparrowhawk *Accipiter gularis* (IUCN LC); Peregrine Falcon *Falco peregrinus* (IUCN LC); Greater Spotted Eagle *Aquila clanga* (IUCN Vulnerable); Osprey *Pandion haliaetus* (IUCN LC). Rupat Island is one of satellite islands with size of 1,500 sq. km, with some 30,000 inhabitants living mostly on the coastline. This island as the narrowest part of the Straits of Malaca between Malay Peninsulas and Indonesia archipelagos with only 38

km of distance over sea. However, this island face heavy threats due to forest destruction and land clearing for plantations. We investigate that almost 5000 m^3 forest wood per days are coming from this island. On the other hand, this island is not included into protected area (non-conservation area), so threats or pressure to this island as important site for migratory raptors become very high. Therefore, conservation efforts in this island is urgently to be done.

Keywords: migratory raptors, Rupat Island, forest destruction

HABITAT TYPE OF WINTERING AREA OF OSPREY (*Pandion haliaetus haliaetus*) IN MULUR RESERVOIR, SUKOHARJO, INDONESIA

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One of migratory raptor species that visiting Indonesia for wintering is Osprey (*Pandion haliaetus haliaetus*). However, wintering area of this species in Indonesia is little known due to the lack information and research activities on this species. One of wintering areas of this species in Indonesia was recorded in Mulur Reservoir at Sukoharjo. This reservoir was built in 1929 covering ca. 151 ha with riverbank along 7.89 km and wetland area on 119.59 ha. The reservoir was surrounded by several habitat types such as forested area including cultivated forest, swamp area, paddy field and local people settlements. This area becomes an important area hosting some resident waterbirds and other migratory waterbirds such as Purple Heron (*Ardea purpurea*), Rainbow Bee-eater (*Merops philippinus*) and other species. Local people in the vicinity of the area also use this reservoir for irrigation of their cultivation and fishing. The study was conducted on 2009-2011; during migration seasons, one individual of this species visited this area for wintering in every year. This individual often used forest edge surrounding the reservoir for daily activities and hunting freshwater fish. Sometime it was observed crossing over reservoir following the river of Kali Jlantah for hunting.

Keywords: Osprey, Mulur Reservoir, wintering area

SPRING HAWK MIGRATION FROM SOYA MISAKI, THE NORTHERN END OF HOKKAIDO

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Steller's Sea-eagles and White-tailed Sea-eagles propagate in the northeastern part of Russia. They come to Hokkaido and stay there during the winter and then fly away toward Sakhalin in February until April next year. I investigated their flight records in Soya Misaki for the past two years. I conducted a 19-day investigation in 2010. I witnessed 2,561 Steller's Sea-eagles and 325 White-tailed Sea-eagles. I counted 5,593 Steller's Sea-eagles and 931 White-tailed Sea-eagles in a 32-day investigation in 2011. In 2010, the greatest number of flights of the Steller's Sea-eagles was 589 on March 10, and that of the White-tailed Sea-eagles was 35 on March 10. In 2011, the greatest number of flights of the Steller's sea-eagles was 961 on March 17 and that of the White-tailed Sea-eagles was 158 on March 24. The time when the largest number of the Steller's sea-eagles flew was from 10:30 to 12:00. 32.7% of all Steller's Sea-eagles flew in this time period in 2011. Because strong winds and heavy snow of Soya Channel were the main barriers against the flights of the sea-eagles, I compared the number of their flights with the weather conditions by the unit of ten minutes and examined the weather conditions that allow the sea-eagles to cross the sea. The average velocity of wind was less than 12.3 m/sec when I observed over 10 sea-eagles crossing the sea per 10 minutes. 76% of the wind direction in this case was WSW-N. The average possible sunshine duration for the sea-eagles' best flights was 5.7 minutes per 10 minutes. Likewise, the average velocity of wind was less than 12.3 m/sec when I witnessed more than 20 sea-eagles per 10 minutes. In this case, 79.7% of the wind direction was WSW-N. The average possible sunshine duration for the sea-eagles' best flights was 5.4 minutes per 10 minutes.

RAPTOR MIGRATION IN SPRING FROM KOREA TO JAPAN

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It is known that most of Oriental Honey-buzzards breeding in Japan take their route through the Korean Peninsula when they come back from wintering area according to the data of the satellite tracking research. And, the field observations in northern Kyushu have been suggested that many Oriental Honey-buzzards flying from the direction of the Korean Peninsula. We counted the number of migratory raptors around Busan in spring from 2009 to 2011. In addition, we observed them too at Tsushima Island in Japan where is a stopover site for migratory birds from Korea at the same time in 2011. Several flocks of Oriental Honey-buzzards appeared around the Taejongdae in Busan in the morning, and most of them flew away toward Tsushima when the weather condition is good, while most of them flew away toward Geoje Island when the weather condition was bad. In the afternoon, while the number of the birds flying away from Busan became fewer, those from Geoje Island increased. And many birds flew away to south or southeast direction from Geoje Island. As the result of survey in Tsushima, many Oriental Honey-buzzards were observed to arrive from Korea and most of them headed toward northern Kyushu.

REGIONAL DISTRIBUTION OF WINTERING CINEREOUS VULTURES (*Aegypius monachus*) IN KOREA

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The Cinereous vulture that is the winter visitor was managed by designating as a natural monument (243-1), endangered species (II), Redlist of Korea (Vulnerable-VU). However, individuals of Cinereous vulture rapidly decrease in forest fire, poison, changed livestock industry. Furthermore, it was scavenger. Due to the food provision events following the increasing number of livestock farms, the populations of Cinereous vultures tend to increase gradually, and therefore it is necessary to exactly grasp its actual status. Accordingly, this study is aimed at preparing the measure of preserving the Cinereous vultures through the change in the population of the wintering in Korea. A total 48 researchers, two persons in a single team, conducted concurrent investigations for single day in 26 areas where was major wintering areas of Cinereous Vultures (*Aegypius monachus*) and a record of observed areas, from 20 Dec. in 2002 to 26 Feb. in 2011. The average number of wintering on Cinereous Vultures was 1252.3 individuals on mean (SD=634.0, Range=246-2,462, n=16). During the survey period, it observed to the number of peak count on 11 Dec. in 2010 with 2,462 individuals and the number of least count on 20 Feb. in 2004 with 246 individuals. Dividing the number of Cinereous Vultures by the region, the central region that includes Gyeonggi-do and Gangwon-do recorded the largest number with 900.4 individuals on mean (SD=464.2, Range=228-1,665, n=16)(71.9%), followed by

351.9 individuals on mean (SD=388.9, Range=11-1,178, n=15) (28.1%) in southern region that includes Gyeongbuk, Gyeongnam, Jeonnam and Jeju. Some dominant regions with significant population of Cinereous Vultures include Cheorwon region with 342.5 individuals (SD=177.8, Range=52-758, n=16), Jangdan Peninsula that showed 336.3 individuals on mean (SD=307.9, Range=15-1,100, n=16) at central region, Goryoung region with 102.9individuals (SD=92.4, Range=31-283, n=8), Goseong that showed 183.7 individuals on mean (SD=238.1, Range=3-827, n=15) at southern region, which account for 77.1% of the entire population of Cinereous Vultures in Korea. There has been a variation in the number of wintering on Cinereous Vultures during survey period, mostly towards the direction of increasing trends (R2=0.252). In addition, it was found there was larger population in the southern region as the population of them has been gradually diffused to the southern area as of 2006. This is deemed because they have gradually moved to the southern region of Korea where the climate is warm and the foods are plentifully supplied compared with the central part owing to the increase in the number of livestock farms and the event of the food provision. In comparison with the tendencies between December (early stage of winter) and February (later stage of winter), the variation of the number of individuals was not constant, from which it is considered that the population varies flexibly depending on the situation of the habitats. In addition, the food resources decreased sharply due to the foot-and-mouth disease in Korea 2010, and therefore the numbers of individuals were found to sharply reduce in the survey conducted in February.

Keywords: Cinereous Vultures (*Aegypius monachus*), wintering, conservation, livestock

MIGRATION OF COMMON BUZZARD, ROUGH-LEGGED BUZZARD AND BLACK KITE TRACKED BY SATELLITE TRACKING IN KOREA

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The migration of Common Buzzard (*Buteo buteo*), Rough legged Buzzard (*Buteo lagopus*) and Black Kite (*Milvus migrans*) were investigated by satellite tracking using platform transmitter terminals (PTTs). Satellite tracking of two Common Buzzards were conducted in Cheorwon (ID 83199) and Busan (ID 83201) respectively in 2010. They started to migrate northward in early April 2010 along to the Korean Peninsula and arrived to the far eastern area of Russia (ID 83199: uska-Orochskaya; ID 83201: selo-Algazeya) in late April 2010. One (ID 83201) of them was cut off during autumn migration and the other one (ID 83199) came back to the Cheorwon where it wintered last season. In the next year in 2011, it showed the similar pattern of the route and period for the migration with last season and used the same area for the breeding and wintering as well. The migration study of Rough-legged Buzzard was conducted in Yesan in 2011. It migrated to the Palana, Kamchatka along to the Korean Peninsula and the far eastern area of Russia from March 11 to Jun 6, 2011. In the autumn migration, it started to migrate on September 15 using the similar route with last spring migration and stopped over at Shuangyashan, China from October 24 to November 9, 2011. Two Black Kites (ID 83200, ID 83202), which wintered in Nakdong estuary in Busan Korea, released with PTTs on Feb 22, 2010 showed that both of them did not migrate to long distance and constantly stayed around Nakdong estuary. During the daytime they had relatively wide home ranges and during the night time they used forests near Dadaepo as their roost site. They were found to travel to Tsushima of Japan for a few days. One (ID 83200) of them was cut off there and the other one (ID 83202) has stayed around

Kamiagatacho Kashitaki in Tsushima from October 10, 2010 to November 13, 2011. In the route of autumn migration for Rough-legged Buzzard, it was similar to that of the spring migration but it may need more time to gather additional information about the complete migration route with the result that it stopped over in the middle of autumn migration. The population of Black kites in Busan, seemed to come and go between Busan, Korea and Tsushima, Japan. The results of this study show that the Northeastern Asia region is very important for the migration of Rough-legged Buzzard and Common Buzzard which used the same region annually for the wintering and breeding season.

SEASONAL PREY SELECTION AND FORAGING PATTERN OF COMMON KESTREL IN SUBURBAN AREA

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In this study, the seasonal prey selection and foraging pattern of Common Kestrel (*Falco tinnunculus*) in suburban area was investigated from Jun 1, 2009 to May 30, 2010. In accordance with the season, the prey was dramatically changed, mainly on insects from summer to autumn, and on small mammals and lizards from winter to spring. Juveniles were observed to feed mainly on insects, and the most main prey was Korean Blackish Cicada (*Cryptotympana atrata*; 75%, n=105) among insects between June and October. In the foraging pattern, the juveniles show higher rates of flight pattern than adult in normal, hunting and feeding times. And the pattern was changed to spending more time in perching in their foraging times from 1st winter (from November in their 1st calendar year). They preferred to perch on artificial structures, such as power pole, electric wire and buildings rather than perch on non-artificial one. They seem to have adapted well to human-made structures in suburban area. Common kestrel was considered to be a seasonally opportunistic forager. In juvenile stage, it prefers not only to hunt insects, especially Korean Blackish Cicada, but to spend more time in flying, which is possibly as a way to develop and train their flights and hunting skills.

DIETS OF PEREGRINE FALCONS IN KOREA: FOOD ITEMS AND SEASONAL CHANGES

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Peregrine Falcons (*Falco peregrinus*) feed on diverse avian prey, and their feeding behaviors have been studied worldwide. However, relatively little information on its diet items and food habits has been reported in Korea as well as NE Asian countries. To identify their prey items, we collected pellets and prey remains around their nests and observed hunting behaviors of Peregrine Falcons in major habitats in Korea from 2001 to 2011. We found that totally 307 prey of 62 species, including two globally threatened species (Crested Murrelets *Synthliboramphus wumizusume* and Fairy Pittas *Pitta nympha*) and three nocturnal raptors (Oriental Scops Owls *Otus sunia*, Japanese Scops Owls *Otus semitorques* and Long-eared Owls *Asio otus*), were predated in Korea. Although their unsuccessful attacks against larger birds such as Grey Herons (*Ardea cinerea*) and Black-faced Spoonbills (*Platalea minor*) were observed, the body mass of predated prey was 210.4±244.6g ranging from 0.3g to 1125g. The most common prey were Ancient Murrelets (33 birds, 201.2g), Oriental Turtle Doves (18 birds, 205.6g), White's Thrushes (16 birds, 118.0g), Swinhoe's Storm Petrels (15 birds, 41.7g) and Feral Pigeons (13 birds, 300.0g). Seasonal change in the falcon's diets was also detected; Peregrine Falcons in Korea mainly consumed big prey (gulls and ducks) in winter when wintering waterbirds dominate, while they fed on diverse small birds from Spring to Autumn. Particularly, falcons on a remote island even preyed on the smallest prey, dragonflies which also cross the ocean as long distance migrants, when both migratory and sedentary birds are scarce just before the autumn migration season. These results indicate that the

Peregrines in Korea mainly forage on diverse avian species with preference for medium sized birds (approx 200g in body mass), but they show opportunistic food habits based on prey availability.

SYNCHRONOUS COUNTING OF THE CRESTED SERPENT EAGLE (*Spilornis cheela*) IN GUANYINSHAN, NORTHERN TAIWAN

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Censusing the population size of a species is an important first step in understanding its ecology and in deciding whether any conservation action is needed. Many raptor species are difficult to census due to their large territory, fast moving, good hiding ability and wariness of people. In tropical/subtropical forests, dense foliage adds further difficulty to raptor census. Counting raptors in Taiwan is such a case. Crested Serpent Eagle (*Spilornis cheela*) is a common forest raptor in Taiwan. Different from other more secretive raptors, it adapts to fragmented forests well, soars frequently, and calls loudly when soaring on warm days. It shows little fear to the approach of people. These characters make it easy to detect. My study area, Guanyinshan, is an isolated hill near Taipei City. I led a team of field observers and counted Crested Serpent Eagles on good-weathered days in March and April of 2007 and of 2008. This was the pre-egg laying period when Serpent Eagles were air born more often than other months. We selected five sites on Guanyinshan to cover the whole sky of this hill. Each survey day, 5 field teams watched the sky from 9 A.M. to 3 P.M. Simultaneously once every 10 minutes, each team of field observers searched the piece of sky they are responsible for, recording the number of Serpent Eagles seen. We made 37 synchronous counts every survey day. In total, we made 296 synchronous counts on 8 days. We found the maximum number of eagles present at a given time was 36 within the sampling area of 25 square kilometers, with the density of 1.44 individuals per square kilometer. It is impossible to count every eagle in this survey, supposing we just counted 60-70% of whole population, and then the population size would be approximately 50-60 individuals, with the density of 2.0-2.4 individuals per square kilometer.

MOVEMENTS OF THE ORIENTAL HONEY BUZZARDS IN TAIWAN

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Oriental Honey Buzzard (*Pernis ptilorhynchus*) is a well known migratory raptor in East Asia. The Taiwan population of this species was previously considered migratory as many birds could be seen flying south among other raptors during autumn. In our study since 2004, we found there is also a resident and breeding population of Oriental Honey Buzzards in Taiwan. To learn the details of the migratory population, we relied on satellite tracking to discover their migration route. From 2009, we satellite marked 6 Oriental Honey Buzzards in central and southern Taiwan, and tracked them through migration seasons. Unfortunately none of the 6 birds left Taiwan, but we learned some unusual movements of the resident population within Taiwan. Only 2 of the 6 Oriental Honey Buzzards stayed within a smaller area near where they were caught. The other 4 birds moved to northern Taiwan during spring migration and stayed through breeding season. By autumn, they all returned to where they were originally caught. During summer months, field workers spotted more Oriental Honey Buzzards in the north than in other regions of Taiwan. The resident population seems to have different strategies of the movements in Taiwan as the season changes.

A STABLE ISOTOPE APPROACH TO IDENTIFY MIGRANTS AND RESIDENTS OF THE ORIENTAL HONEY BUZZARD IN TAIWAN

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Avian migration is genetically programmed but is also controlled by proximate factors such as weather, food, and human activities. Oriental honey buzzard (*Pernis ptilorhynchus*) has 6 subspecies, among which only *P. p. orientalis* is migratory. The Taiwan population was previously thought to be entirely migratory, until a breeding population was found in 2004. However, migratory and residential populations are not readily identifiable by their morphology, habitat use, or behavior. In this research, we developed a new approach to differentiate migrants and residents by analyzing the stable-hydrogen isotope ratio in their primary feathers. Stable-hydrogen isotopes in the feathers of several migratory bird species were found to vary latitudinally as a function of stable-hydrogen isotope ratios of local precipitation. Migrant Oriental honey buzzards that experience a wide range of latitudes should differ from residents in Taiwan by the sequential stable-hydrogen isotope ratio of different primary feathers. Cluster analysis and bootstrapping of the results from 49 birds showed two clear and stable groups. All the known residents were clustered in the same group. We believe that this approach is reliable in revealing migrant from resident oriental honey buzzards and is applicable to studying other raptors that contain both resident and migratory populations

DIET OF LESSER KESTRELS (*Falco naumanni*) IN IKH NART NATURE RESERVE, MONGOLIA

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Lesser Kestrels (*Falco naumanni*) are declining throughout much of their range. In Mongolia, Lesser Kestrels are faring better and inhabit arid steppe regions and nest in areas with rocky outcrops or talus slopes. Most studies of lesser kestrels occur in Europe or Africa, so little is known about the species in Asia. We conducted a dietary study in 2009 and 2010 in Ikh Nart Nature Reserve, Mongolia. We collected pellets from May to September in 2009 and 2010, dissected macroscopic remains, and identified food items to the lowest taxonomic level possible using reference collections at the Mongolian Academy of Sciences. We calculated percent occurrence (PO) and percent volume (PV) of food groups and determined dietary breadth using Levins' index. We estimated the abundance of three major prey groups, lizards, insects, and rodents, in Lesser Kestrels' diets each month using line transect surveys to estimate lizard densities, dry pitfall traps to estimate relative insect activity, and live traps to estimate small mammal density. We collected 762 pellets. Insect remains occurred in 76.3 % of pellets (PO), accounting for 69.6 percent volume (PV) of those pellets and represented by three orders: beetles (Coleoptera), crickets and grasshoppers (Orthoptera), and cockroaches (Blattoptera). We identified 21 genera of insects representing 10 families. Reptiles occurred in 15.34% in the pellets accounting for 17.34 PV. We found small mammal remains in 6.2% (PV = 10.1) of pellets, representing two families Muridae and Dipodidae. We found bird remains, including bones and feather, 1.6 % of kestrel pellets. We also found small stones and plant remains in pellets. Lesser Kestrels displayed some seasonality in prey selection that did not match changes in prey abundance estimates, but appeared to change as gravid grasshopper became available. We recorded generally low niche breadth throughout the study, ranging from 0.07 to 0.54.


7th ARRCN Symposium on Asian Raptors / 13~16 Jan 2012 / Republic of Korea

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ISBN 978-89-97491-08-7