

ARRCN  
2022



12TH ASIAN RAPTOR RESEARCH  
AND CONSERVATION NETWORK SYMPOSIUM

PROGRAMME BOOK

20-22 January 2022



## Preface

Dear speakers and participants of the 12th ARRCN Symposium,

We sincerely thank you for your valuable support and participation in this symposium!

For the second time, Malaysia is hosting the Asian Raptor Research and Conservation Network Symposium (ARRCN) Symposium after the first in Taiping in 2005. This is the first time that we are doing a virtual symposium.

### **“Strengthening Connections & Collaborations in Raptor Conservation & Research in the Changing Environment”**

The symposium theme for this year reflects the challenges of raptor research and conservation in the rapidly changing environment either with respect to the global weather or ecosystem as well as human health. In spite of that, the theme also stresses the importance of staying connected so as to improve our collaborations in what we do in saving raptors from different corners of the world.

Despite the challenges, including postponement and cancellation of what had been planned for a physical meeting, we managed to convert the 12th ARRCN Symposium into a virtual conference. This is one way to maintain the tradition of having a biennial meeting among the raptor researchers and enthusiasts to keep everyone connected and updated on raptor work to discuss the challenges and future plans for raptor research and conservation.

In this programme book, you will find the full symposium schedule and a guide on how to join the symposium, as well as 69 abstracts that we have compiled for two full days of scientific presentations followed by five post-conference workshops on the third day of the symposium. We apologise in advance for the potential issues with virtual meeting such as internet connection issues and difficulty in participating fully in all the sessions due to difference in time zone of your country. We will make all recordings of the presentations available for viewing after the symposium.

For the scientific sessions on the first two days, we are delighted and grateful to all speakers and presenters who have accepted our invitation to share their research findings and experiences. There is a total of eight concurrent sessions within the themes Raptor Ecology & Behaviour; Environmental Changes & Threats; Local Community Involvement; Autecological Studies of Raptors; Monitoring of Raptor Migration; Local Raptor Monitoring; Zoonosis & Raptor Medicine; and Genetic Variation of Raptors. We tried our best to design the programme to fit the schedules and time zones of all speakers, and we hope you would understand if some presentations have been scheduled slightly earlier in the morning or later in the evening. In addition, the post-symposium workshops are planned to provide capacity building to train more young raptor researchers to impart skills and knowledge needed for future research.

Again, we could not have done this without you. We are grateful to individuals, organisations, and sponsors who have contributed one way or another in supporting this symposium. Wishing everyone a fruitful meeting!

Sincerely,  
Symposium Organising Committee

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# Asian Raptor Research and Conservation Network (ARRCN)



The ARRCN recognises the importance of protecting raptors that serve as umbrella and indicator species of environmental changes. The protection of these magnificent birds of prey is crucial for maintaining ecosystem health and biodiversity as a whole, as well as contributing to human well-being in the long run. At present, the ARRCN consists of 260 members from 33 countries.

The aims of ARRCN are:

- To exchange information concerning raptors among member countries
- To compile data about raptors, especially about status of raptors native to Asia
  - Status of raptors in Asia: distribution, population, habitat, ecology, breeding, and all other aspects important to their conservation
  - References on each species
  - Resources important to raptor research and conservation: experts and institutions
- To coordinate the following activities for members
  - Research on raptor migration, common and widespread raptor species in Asia
  - Training programmes (hands-on training)
- To educate the public
  - Public engagement: training of local communities
  - Production of movies, films, and documentaries to raise awareness
  - Providing workshops and laboratories for capacity building

Over the past two decades, since the first symposium in Shiga, Japan, the ARRCN member countries/representatives have taken turns to organise a series of symposia, as follows:

1. December 1998 – Japan
2. July 2000 – Indonesia
3. October 2003 – Taiwan
4. October 2005 – Malaysia
5. April 2008 – Vietnam
6. June 2010 – Mongolia
7. January 2012 – South Korea
8. February 2014 – India
9. October 2015 – Thailand
10. October 2017 – Philippines
11. October 2019 – Indonesia

For more information about ARRCN activities, do visit: <http://www5b.biglobe.ne.jp/~raptor/>

# Symposium Organising Committee

## Host Organisations:

- Universiti Putra Malaysia
- Asian Raptor Research and Conservation Network
- Malaysian Nature Society

## Advisor

- Toru Yamazaki (President of ARRCN)

## Chairman

- Chong Leong Puan

## Secretary

- Diana Emang

## Online Registration & Meeting Platform

- Sheena Bidin
- Ruzana Adibah Mohd Sanusi
- Batrisyia Teepol
- Lee Zan Hui
- Sharifah Nur Ain Mahiyuddin
- Al-Kautsar Hidayanto Abdul Rahim
- Amera Natasha Mah Muhammad Adam Mah
- Syed Afiq Zulhusni Wan Ismail

## Scientific Committee

- Chin Aik Yeap
- Kim Chye Lim
- Wei Lun Ng
- Su Ping Ong
- Mohamed Zakaria Hussin
- Jalila Abu
- Mohd Azlan Jayasilan Abdul Gulam Azad
- Faisal Ali Anwarali Khan
- Mohamad Fizl Sidq Ramji
- Chong Leong Puan

## Publicity/Promotion & Website

- Mark Ng
- Rose Au Nyat Jun
- Yeo Siew Teck
- Roger Teo
- Jason Teo

Symposium website: [www.rrcn2022.com](http://www.rrcn2022.com)

## Access to Zoom

Join Zoom Meeting

<https://us02web.zoom.us/j/89204442262?pwd=eGJNTUNlcy9iWDZpbGVvTlFlGRQQT09>

Meeting ID : 892 0444 2262

Passcode : 2022

(Note: The same meeting link will be used throughout the symposium, including workshops.)

## Full Symposium Schedule

(Note: The times indicated here are referring to Malaysian time (GMT +8). All presenters are encouraged to check the scheduled presentations, and take note of the corresponding times in your respective time zones.)

### DAY 1: 20 January 2022 (Thursday)

| Time (MYT/ GMT +8)      | Duration    | Activities   |
|-------------------------|-------------|--|
| 7.00 a.m. – 8.00 a.m.   | 1 hr        | Admission of participants  |
| 8.00 a.m. – 8.10 a.m.   | 10 min      | Welcoming speech by Chong Leong Puan, Symposium Chairperson  |
| 8.10 a.m. – 8.20 a.m.   | 10 min      | Welcoming speech by Toru Yamazaki, President of ARRCN  |
| 8.20 a.m. – 8.30 a.m.   | 10 min      | Welcoming speech by Prof. Dr. Ahmad Ismail, President of Malaysian Nature Society  |
| 8.30 a.m. – 9.00 a.m.   | 30 min      | Opening address by Rob Bierregaard, President of Raptor Research Foundation  |
| 9.00 a.m. – 9.15 a.m.   | 15 min      | Photo session & break (video screening)  |
| 9.15 a.m. – 10.00 a.m.  | 45 min      | <b>KEYNOTE SPEAKER:</b> Lucia Liu Severinghaus (Academia Sinica, Taiwan)<br><b>Long-term study of Lanyu Scops-Owl</b><br>Chairperson: Allen Jeyarajasingam (Malaysian Nature Society)  |
|                         |             | <b>COUNTRY REPORTS</b><br>Chairperson: Kim Chye Lim (Malaysian Nature Society)   |
| 10.00 a.m. – 10.20 a.m. | 20 min      | <b>ARRCN country report 2022: Japan</b><br><i>Authors: Inoue Takehiko and Murate Tatsuyoshi</i>  |
| 10.20 a.m. – 10.40 a.m. | 20 min      | <b>Raptor research and conservation in Korea</b><br><i>Authors: Hankyu Kim, Yu-Seong Choi, Wee Haeng Hur, Seung-Gu Kang and Chang-Yong Choi</i>  |
| 10.40 a.m. – 11.00 a.m. | 20 min      | <b>Growing public concern for raptor conservation in Taiwan</b><br><i>Authors: Tai-Hua Tsai and Si-Min Lin</i>   |
| 11.00 a.m. – 11.20 a.m. | 20 min      | <b>Updates on raptor research and conservation in Vietnam</b><br><i>Author: Le Manh Hung</i>   |
| 11.20 a.m. – 11.40 a.m. | 20 min      | <b>Philippines: Country report</b><br><i>Authors: Alex M. Tiongco and Ma. Terasa A. Cervero</i>  |
| 11.40 a.m. – 12.00 p.m. | 20 min      | <b>Recent raptor-related work in Malaysia</b><br><i>Author: Chong Leong Puan</i>   |
| 12.00 p.m. – 12.20 p.m. | 20 min      | <b>Country report – Singapore</b><br><i>Author: Gim Cheong Tan</i>   |
| 12.20 p.m. – 12.40 p.m. | 20 min      | <b>Updates on raptors in Indonesia: Conservation status, conservation actions and migration</b><br><i>Authors: Luh Putu Eswaryanti Kusuma Yuni and (Adam) A. Supriatna</i>   |
| 12.40 p.m. – 1.00 p.m.  | 20 min      | <b>Raptor research and conservation in Nepal</b><br><i>Authors: Tulsi Ram Subedi and Sandesh Gurung</i>  |
| 1.00 p.m. – 2.30 p.m.   | 1 hr 30 min | Lunch break  |
| 2.30 p.m. – 3.00 p.m.   | 30 min      | <b>PLENARY SPEAKER 1:</b> Marc Kery (Swiss Ornithological Institute)<br><b>The power of occupancy modelling for raptor and owl population studies</b><br>Chairperson: Prof. Dr. Mohamed Zakaria Hussin (Universiti Putra Malaysia) |
|                         |             | <b>CONCURRENT SESSION 1 (ROOM 1):</b><br>Raptor Ecology & Behaviour<br>Chairperson: Dency Flenny Augustine Gawin (Universiti Malaysia Sarawak)   |
|                         |             | <b>CONCURRENT SESSION 2 (ROOM 2):</b><br>Environmental Changes & Threats<br>Chairperson: Evelyn Lim Ai Lin (Universiti Putra Malaysia)   |

|                       |        |   |   |
|-----------------------|--------|---|---|
| 3.00 p.m. – 3.20 p.m. | 20 min | <b>Habitat use of roosting site and movement pattern of Australasian Grass-Owl</b><br><i>Authors: Jo-Szu Tsai, Jia-Jia Lyu, Yi-Shuo Tseng and Chia-Hao Chang</i>  | <b>The Global Anthropause Raptor Research Network: How raptor research during the COVID-19 pandemic provides invaluable opportunities for conservation biology</b><br><i>Authors: Petra Sumasgutner, Ralph Buij, Christopher J.W. McClure, Phil Shaw, Cheryl R. Dykstra, Nishant Kumar and Christian Rutz</i>       |
| 3.20 p.m. – 3.40 p.m. | 20 min | <b>Factors influencing habitat-use of owls in and around Community Reserves in Meghalaya, north-east India</b><br><i>Authors: S. Sangeeth Sailas, Aritri Sarkar, Santhanakrishnan Babu, P. Pramod, P. V. Karunakaran and H. N. Kumara</i>   | <b>Climate change leads to range contraction for the “Hachikuma” raptors: How to point out the future conservation strategies?</b><br><i>Authors: Aryo A. Condro, Syartinilia, Hiroyoshi Higuchi, Yeni A. Mulyani, Rika Raffudin, Lufthi Rusniarsyah, Yudi Setiawan and Lilik B. Prasetyo</i>                       |
| 3.40 p.m. – 4.00 p.m. | 20 min | <b>Nest site selection of Black Kites (<i>Milvus migrans</i>) in Pingtung, Taiwan</b><br><i>Authors: Yun-Chieh Huang, Hui-Shan Lin and Yuan-Hsun Sun</i>  | <b>Raptor migration at Guantouling, south-west China: Phenology, weather influence and persecution pressure</b><br><i>Authors: Xu Shi, Xiaobo Xiao, Xinyi Zhao, Renjie Sun, Xingfeng Zhao, Chi-Yeung Choi and Wuying Lin</i>  |
| 4.00 p.m. – 4.20 p.m. | 20 min | <b>Nesting of Jerdon's Baza <i>Aviceda jerdoni</i> in Phetchaburi Province, Western Thailand</b><br><i>Authors: Cheewin Chaiburin and Chaiyan Kasomdorkbua</i>  | <b>Abundance of island avian predators in a heavily impacted tropical forest suggests that endemics face greatest risk from landscape changes</b><br><i>Authors: Camille B. Concepcion, Adam E. Duerr, Keith L. Bildstein, Petra B. Wood and Todd E. Katzner</i>  |
| 4.20 p.m. – 4.40 p.m. | 20 min | <b>Observations of the nesting of the Oriental Honey-Buzzard <i>Pernis ptilorhyncus torquatus</i> - Tweeddale morph in Ipoh, Perak, Malaysia</b><br><i>Authors: Chiu Sein Chiong and Chan Kai Soon</i>                                      | <b>The conflict of greens in offshore wind energy development from the perspective of raptor migration in East Asia</b><br><i>Author: Chien-Hung Yang</i>   |
| 4.40 p.m. – 5.00 p.m. | 20 min | <b>Breeding biology, social interactions and conservation of the semi colonial Montagu's Harrier in the Spanish Extremadura</b><br><i>Authors: Brigitte Berger-Geiger, C. Giovanni Galizia, Alfonso Godino and Manuel Calderón Carrasco</i> | <b>Richness and abundance of raptors in response to wind farms in Central Karnataka, India</b><br><i>Authors: G. Babu Rao, S. Babu, Honnavalli N. Kumara, Malyasri Bhattacharya, D. Tamiliyan and Mahesh Bilaskar</i>   |
| 5.00 p.m. – 5.20 p.m. | 20 min | <b>Vocal activity of the Changeable Hawk-Eagle (<i>Nisaetus cirrhatus</i>) in Peninsular Malaysia</b><br><i>Authors: Amera Natasha Mah Muhammad Adam Mah, Mohamed Zakaria and Chong Leong Puan</i>  | <b>Updated range metrics and a global population estimate for the critically endangered Philippine Eagle using a spatial ensemble habitat model</b><br><i>Authors: Luke J. Sutton, Jayson C. Ibañez, Dennis I. Salvador, Rowell L. Taraya, Guiller S. Opiso, Tristan P. Senarillos and Christopher J.W. McClure</i> |
| 5.20 p.m. – 5.40 p.m. | 20 min | <b>Ecological niche model reveals the differential space use by the sympatric raptors of Andaman archipelago, India</b><br><i>Authors: Shanmugavel Sureshmarimuthu, Santhanakrishnan Babu and Honnavalli Nagaraj Kumara</i>                 | <b>The Northwesterniana Flyway, Luzon, Philippines: A five-year raptor monitoring research in a changing environment and extreme climatic conditions</b><br><i>Authors: Michael Agbayani Calaramo, Alex Tiongco, Teresa Cervero, Venus Palting, Fe Pungtilan and Gaspar Kristel</i>                                 |
| 5.40 p.m. – 6.00 p.m. | 20 min | <b>Factors influencing the occurrence and abundance of owls in Western Ghats, India</b><br><i>Authors: Santhanakrishnan Babu, Eluvathingal Antony Jayson and Muniandy Sivaram</i>   | <b>Java's owl trading in pandemic era</b><br><i>Author: Diyah Wara Restiyati</i>  |
| 6.00 p.m. – 6.10 p.m. | 10 min | <b>Nest observation of Black-thighed Falconet in Phetchaburi Province, Western Thailand</b><br><i>Authors: Thanawat Punyasiri and Chaiyan Kasomdorkbua</i>  |   |
| End of first day      |        |   |   |

## DAY 2: 21 January 2022 (Friday)

| Time (MYT/ GMT +8)    | Duration | Activities   |
|-----------------------|----------|--|
| 7.00 a.m. – 8.00 a.m. | 1 hr     | Admission of participants  |
| 8.00 a.m. – 8.30 a.m. | 30 min   | <b>PLENARY SPEAKER 2:</b> Christopher McClure (Peregrine Fund)<br><b>The Global Raptor Impact Network: A collaboration to monitor and conserve the world's raptors</b><br>Chairperson: Prof. Dr. Ahmad Ismail (Malaysian Nature Society) |
|                       |          | <b>CONCURRENT SESSION 3 (ROOM 1):</b><br>Local Community Involvement<br>Chairperson: Zamri Rosli (Universiti Putra Malaysia)   |
|                       |          | <b>CONCURRENT SESSION 4 (ROOM 2):</b><br>Autecological Studies of Raptors<br>Chairperson: Mohammad Saiful Mansor (Universiti Kebangsaan Malaysia)  |

|                         |        |   |  |
|-------------------------|--------|---|--|
| 8.30 a.m. – 8.50 a.m.   | 20 min | <b>Community engagement on Flores Hawk-Eagle (<i>Nisaetus floris</i>) conservation action in Ende, Flores, Indonesia</b><br>Authors: Oki Hidayat, Wieke Hemingtyas and Nardy Noerman Najib  | <b>Peregrine Falcon survival rates derived from a long-term study at a migratory and overwintering area in coastal Washington, USA</b><br>Authors: Daniel E. Varland, Larkin A. Powell, Joseph B. Buchanan, Tracy L. Fleming and Cheryl Vanier   |
| 8.50 a.m. – 9.10 a.m.   | 20 min | <b>Sustainable palm oil and Barn Owls in Malaysia</b><br>Authors: Shakinah Ravindran and Hasber Salim   | <b>Assessing diet of the Black-thighed Falconet (<i>Microhierax fringillarius</i>) in Peninsular Malaysia</b><br>Authors: Nor Adibah Ismail, Ummi Nur Syafiqah Daud, Connie Khoo Siew Yoong, Chong Leong Puan, Nurul Ashikin Abdullah, Amira Aqilah Muhammad, Shukor Md Nor and Mohammad Saiful Mansor                           |
| 9.10 a.m. – 9.30 a.m.   | 20 min | <b>Short-term results of a Barn Owl translocation programme from Peninsular Malaysia to Sabah, Borneo</b><br>Authors: Hasber Salim, Cik Mohd Rizuan Zainal Abidin, Hafidzi Mohd Noor, Noor Hisham Hamid and Shakinah Ravindran              | <b>Reviewing the current distribution of Javan Hawk-Eagle (<i>Nisaetus bartelsi</i>): A case study involving citizen science data from Burungnesia database</b><br>Authors: Riri Wiyanti Retnaningtyas, Fitriana Salehah, Millenia Luna Amengka, Waskito Kukuh Wibowo and Swiss Winnasis Bagus Prabowo                           |
| 9.30 a.m. – 9.50 a.m.   | 20 min | <b>Barn Owl island: A model of Barn Owl reintroduction to a small area of palm oil plantation</b><br>Authors: Kriangsak Hamari, Nirawat Sinnarong, Worata Klinsawat, Manakom Sukmak and Worawidh Wajjwalku                                  | <b>Habitat suitability modelling of Sunda Scops-Owl (<i>Otus lempiji</i> Horsfield 1821) using Geographic Information System in Java Island based on Burungnesia citizen science data</b><br>Authors: Fitriana Salehah, Riri Wiyanti Retnaningtyas, Millenia Luna Amengka, Waskito Kukuh Wibowo and Swiss Winnasis Bagus Prabowo |
| 9.50 a.m. – 10.10 a.m.  | 20 min | <b>Historical-biographical study on Grey-faced Buzzard (<i>Butastur indicus</i>) from the perspectives of the old folks in Sanchez Mira, Cagayan, Philippines</b><br>Authors: Narcitas B. Ouano, Verlino D. Baddu and John Lester T. Tabian | <b>The winter ecology of Pallid Harrier <i>Circus macrourus</i> in northwestern India</b><br>Author: Ashok Verma   |
| 10.10 a.m. – 10.30 a.m. | 20 min | <b>A five-year comparative study of raptor migration count at Cape San Agustin, The Philippines (2016-2020)</b><br>Authors: LANTAW Birdwatch Club Members and Dennis P. Melanio   | <b>Habitat projections for conservation using species distribution models: A case of globally threatened Egyptian Vulture in northern India</b><br>Authors: Radhika Jha, Amita Kanaujia and Kaushalendra Kumar Jha   |
| 10.30 a.m. – 10.50 a.m. | 20 min | <b>The role of monitoring, rescue and rehabilitation of Gyps vultures in reducing the rate of mortality in Raigad, India</b><br>Authors: Premsagar Mestri, Madhuri Pejaver, Rupa Dawne, Pranav Kulkarni, Pooja Pujari and Samiya Sayyad     | <b>Population levels and productivity of the critically endangered White-rumped Vulture (<i>Gyps bengalensis</i>) are stable in Arghakhanchi District, Nepal</b><br>Authors: Krishna Prasad Bhusal, Ankit Bilash Joshi, Deu Bahadur Rana, Deelip Chand Thakuri and Christopher J.W. McClure                                      |
| 10.50 a.m. – 11.00 a.m. | 10 min | Break (video screening)   |  |
| 11.00 a.m. – 11.30 a.m. | 30 min | <b>PLENARY SPEAKER 3:</b> Ding Li Yong (BirdLife Asia)<br><b>What are the next steps for conserving migratory raptors in the East Asian Flyway?</b><br>Chairperson: Prof. Dr. Shahrul Anuar Mohd Sah (Universiti Sains Malaysia)            |  |
|                         |        | <b>CONCURRENT SESSION 5 (ROOM 1):</b><br>Monitoring of Raptor Migration<br>Chairperson: Mark Ng (Malaysian Nature Society)  | <b>CONCURRENT SESSION 6 (ROOM 2):</b><br>Local Raptor Monitoring<br>Chairperson: Chin Aik Yeap (Malaysian Nature Society)  |
| 11.30 a.m. – 11.50 a.m. | 20 min | <b>Five-year monitoring of migratory raptors during autumn season in Glan, Sarangani Province, Philippines</b><br>Authors: Joylyn R. Dayondon, Roy O. Mejorada and Cornelio M. Ramirez, Jr.   | <b>Record of raptor species in the northernmost village of Badung Regency, Bali</b><br>Authors: Michelle Angelina Sharon, Luh Putu Eswaryanti Kusuma Yuni, I Made Saka Wijaya and Ida Ayu Eka Pertiwi Sari   |
| 11.50 a.m. – 12.10 p.m. | 20 min | <b>Dynamics of raptor migration in Cape San Agustin, Davao Oriental, Philippines</b><br>Authors: Giovanna G. Tampus, Bernadette J. Nannual and Laurie J. Goodrich   | <b>Correlations of climatic factors on the presence of raptor species in Prapat Agung Peninsula, Bali Barat National Park</b><br>Authors: Luh Putu Eswaryanti Kusuma Yuni, Gde Oka Widiyavedanta, F. X. Sudaryanto and I Gusti Ayu Made Srinadi  |
| 12.10 p.m. – 12.30 p.m. | 20 min | <b>Migration ecology of Chinese Sparrowhawks in the East Asian-Australasian Flyway</b><br>Authors: Jo-Szu Tsai, Yi-Hua Tsai, Jia-Jia Lyu, Chien-Wei Tseng, Hung-Ming Chang, Chang-Yong Choi, Hyun-Young Nam and Keith L. Bildstein          | <b>Significance of monsoon forest for the presence of birds of prey in Prapat Agung Peninsula, West Bali National Park</b><br>Authors: Gde Oka Widiyavedanta, Luh Putu Eswaryanti Kusuma Yuni and F. X. Sudaryanto   |
| 12.30 p.m. – 12.50 p.m. | 20 min | <b>Different migration routes of Black Kite <i>Milvus migrans</i> subspecies in Thailand</b><br>Authors: Chaiyan Kasomdorkbua, Chanatip Ummee, Innokentyi Okhlopkov and Prateep Duangkae  | <b>Observation on raptors in selected Central Forest Spine (CFS) ecological corridors in Peninsular Malaysia</b><br>Authors: Shahfiz Mohammad Azman, Faradiana Noor Md Fauzi and Nor Hazwani Ahmad Ruzman  |



|  |        |  |  |
|--|--------|--|--|
| 12.50 p.m. – 1.10 p.m.                 | 20 min | <b>Preliminary report of raptor migration survey at Longquanshan, Chengdu, Sichuan, China (2020-2021)</b><br><i>Authors: Zhu Lei, Yang Xiao-nong, Tang Kai, Wang Hui and Jiang Zhi-you</i>   | <b>Road transect surveys and mapping of forest raptor communities in Luzon, Philippines</b><br><i>Authors: Jelaine L. Gan and Carmela P. Española</i>  |
| 1.10 p.m. – 1.30 p.m.                  | 20 min | <b>Raptor migration count in Kenting National Park, Taiwan</b><br><i>Authors: Tsai Yi Hua, Tseng Chien Wei and Lin Si Min</i>  | <b>Avifaunal assessment of the Capisaan cave system, Philippines: Towards protection and conservation of endemic and migratory bird species</b><br><i>Authors: Jayson Q. Caranza and Erickson A. Tabayag</i>   |
| 1.30 p.m. – 2.30 p.m.                  | 1 hr   | Lunch break  |  |
| 2.30 p.m. – 3.00 p.m.                  | 30 min | <b>PLENARY SPEAKER 4:</b> Jalila Abu (Universiti Putra Malaysia)<br><b>Integrating avian medicine into raptor research and conservation</b><br>Chairperson: Gim Cheong Tan (Nature Society, Singapore)   |  |
|  |        | <b>CONCURRENT SESSION 7 (ROOM 1):</b><br>Zoonosis & Raptor Medicine<br>Chairperson: Nur Indah Ahmad (Universiti Putra Malaysia)  | <b>CONCURRENT SESSION 8 (ROOM 2):</b><br>Genetic Variation of Raptors<br>Chairperson: Wei Lun Ng (Xiamen University Malaysia)  |
| 3.00 p.m. – 3.20 p.m.                  | 20 min | <b>Prevalence of avian malaria in raptors in Bangphra Wildlife Breeding Center, Thailand</b><br><i>Authors: Sirawit Subaneg, Nithima To-aditthep, Benya Chatkaewchai, Aksarapak Kaewpong, Ratiwan Sitdhibutr, Preeda Lertwatcharasarakul and Chaiyan Kasomdorkbua</i>  | <b>Genetic relationships in Black Kites (<i>Milvus migrans</i>) from Northeast Asia, Japan, Taiwan, India and Australia</b><br><i>Authors: Natalya G. Andreyenkova, Shiao-Yu Hong, Hui-Shan Lin, Igor V. Karyakin, Yasuko Iwami, Ruslan A. Kirillin and Ivan Literák</i>     |
| 3.20 p.m. – 3.40 p.m.                  | 20 min | <b>Cerebral cyst in a Changeable Hawk-Eagle (<i>Nisaetus cirrhatus</i>)</b><br><i>Authors: Warih Pulung Nugrahani, Andreas Bandang Hardian, Irahma Putri Rahmawati and Sitarina Widyarani</i>  | <b>Analysis of genetic structure and genetic diversity in Japanese Black Kite population using mtDNA</b><br><i>Authors: Kazuya Nagai and Ken-ichi Tokita</i>   |
| 3.40 p.m. – 4.00 p.m.                  | 20 min | <b>Hematologic profile and value comparison of Changeable Hawk-Eagle (<i>Nisaetus cirrhatus</i>) with pododermatitis and ectoparasites infestation</b><br><i>Authors: Irahma Putri Rahmawati, Warih Pulung Nugrahani, Guruh Jaya Wisnuwardhana, Andreas Bandang Hardian, Naufal Seta Kumianta, Natanael Baptista Haryosakti and Randy Kusuma</i> | <b>Extent and symmetry of tail moult in Amur Falcons</b><br><i>Authors: Oluwadunsin E. Adekola, David G. Allan, Zephne Bernitz, Wiseman Dlungwana and Peter G. Ryan</i>  |
| 4.00 p.m. – 4.20 p.m.                  | 20 min | <b>Molecular detection of influenza A viruses and H5 subtype among migratory Amur Falcons and captive birds of prey</b><br><i>Authors: Mohamed E. El Zowalaty, Jennifer DeBeauchamp, Trushar Jeevan, John Franks, Kimberly Friedman, Rina Pretorius, Sean G. Young, Robert G. Webster and Richard Webby</i>                                      | <b>Blood cells morphometry and descriptive morphology of captive Changeable Hawk-Eagle (<i>Nisaetus cirrhatus</i>) at Wildlife Rescue Centre Jogja</b><br><i>Authors: Andreas Bandang Hardian, Warih Pulung Nugrahani, Irahma Putri Rahmawati and Dorothea Vera Megarani</i> |
| 4.20 p.m. – 4.40 p.m.                  | 20 min | <b>Short-term exposure of anticoagulant rodenticides enhances the toxin tolerance in prey (<i>Rattus losea</i>) to predator (<i>Elanus caeruleus</i>)</b><br><i>Authors: Wen-Loung Lin, Kuan-Hao Chen, Si-Min Lin and Hui-Yun Tseng</i>  | <b>Blood profile of Barn Owl (<i>Tyto alba javanica</i>) in Cancangan, Wukirsari, Cangkringan, Sleman, Yogyakarta</b><br><i>Authors: Abdurrahman Hanif, Doddi Yudhabuntara and Lim Wen Sin</i>   |
| 4.40 p.m. – 4.50 p.m.                  | 10 min | Break (video screening)  |  |
| 4.50 p.m. – 5.00 p.m.                  | 10 min | Closing speech by Toru Yamazaki, President of ARRCN  |  |
| 5.00 p.m. – 5.10 p.m.                  | 10 min | Closing speech by Chong Leong Puan, Symposium Chairperson  |  |
| End of symposium (scientific sessions) |        |  |  |

## DAY 3: 22 January 2022 (Saturday)

### Post-symposium Workshops

| Time (MYT/ GMT +8)      | Duration    | Workshops & Instructors   |
|-------------------------|-------------|---|
| 7.30 a.m. – 8.00 a.m.   | 30 min      | Admission of participants   |
| 8.00 a.m. – 9.00 a.m.   | 1 hr        | <b>WORKSHOP 1:</b> Occupancy Modelling I – Ravinder Kaur            |
| 9.00 a.m. – 10.00 a.m.  | 1 hr        | <b>WORKSHOP 2:</b> Occupancy Modelling II – Hankyu Kim              |
| 10.00 a.m. – 10.30 a.m. | 30 min      | Break   |
| 10.30 a.m. – 11.30 a.m. | 1 hr        | <b>WORKSHOP 3:</b> Species Distribution Modelling – Yen Yi Loo      |
| 11.30 a.m. – 1.00 p.m.  | 1 hr 30 min | Lunch break   |
| 1.00 p.m. – 2.00 p.m.   | 1 hr        | <b>WORKSHOP 4:</b> Raptor Tracking Technology/ Devices – Hansoo Lee |
| 2.00 p.m. – 3.00 p.m.   | 1 hr        | <b>WORKSHOP 5:</b> Handling Injured Raptors – Jalila Abu            |
| End of workshops        |             |   |

## Guidelines for Participants

- The symposium will start promptly according to schedule via the Zoom meeting platform. Please enter the meeting room **15 min before** the scheduled time.
- Please indicate your full name as registered.
- The symposium will be recorded, and participants will be muted during all sessions, except during the Q&A time of each session, to avoid any disturbances when the event is on-going.
- Please use the chat room to type out your questions during the oral presentations or you can choose to unmute yourself when asking questions during the Q&A time. For some of the pre-recorded presentations, the presenters may not be able to join the symposium due to time difference. We thus encourage you to contact the presenters if you have any questions. The symposium secretariat can also help to pass your questions to the presenters via email.
- Participants are encouraged to turn on cameras during the photo session.
- Please remember to check your time zone to avoid missing any session. Online tools are available to help with time zone conversion (e.g. <https://www.timeanddate.com/worldclock/converter.html>).
- The opening and closing sessions, including keynote and plenary sessions, will be conducted in the main Zoom meeting room (when you first enter Zoom). For the daily concurrent oral presentations, you are free to enter any of the two break-out rooms (i.e. Room 1 or Room 2) whenever you want. Please refer to the programme schedule for the break-out rooms available for each session.
- If you are not familiar with the Zoom platform, you are encouraged to refer to <https://support.zoom.us/hc/en-us>, prior to the actual event.
- A feedback form (in the form of a Google form) will be distributed in the chat room at the end of the symposium. Your feedback would help us improve for the next symposium.
- Please send your inquiries or requests, if any, to **arrcn2022@gmail.com** and the symposium secretariat can try to assist you as much as possible.

## Guidelines for Oral Presenters

- Please enter the meeting room **15 min before** your scheduled presentation.
- Please check your time zone to avoid missing your session. Note that there can be differences in the scheduled time (Malaysian time, MYT) and date depending on your time zone. Online tools are available to help with time zone conversion (e.g. <https://www.timeanddate.com/worldclock/converter.html>).
- For live presentations, you will be given 15 min to present using PowerPoint via Zoom, followed by 5 min of Q&A time. However, since some presenters have requested for more time to be given for their presentation, we are happy to allocate all 20 min for your presentation as well. The symposium secretariat will gather all questions from the audience and have them emailed to you after the symposium. We hope all presenters can keep to the presentation time allocated to avoid any delays in the subsequent presentations.
- For pre-recorded presentations, the time given will be the same as live presentations (15 min + 5 min Q&A), if you are able to attend the 5 min Q&A after we have played your recording. For those who are unable to join the symposium due to time difference, we have allocated all 20 min for your pre-recorded presentation.
- Do test your Zoom settings to make sure that your presentation, videos, and audio will run and play smoothly before the actual event. Zoom allows users to login even without a meeting to be familiar with the system. In the case that a speaker is experiencing network connection or equipment problems, he/she may be rescheduled to make his/her presentation at a later time within the same session. Otherwise, the host may allocate more time for Q&A in the session in case a speaker next to that fails to turn up due to unexpected circumstances.

# **ABSTRACTS**

## **Keynote & Plenary Sessions**

# Long-term study of Lanyu Scops-Owl

Lucia Liu Severinghaus\*

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## Abstract

With global climate change and increasing sea level rises, there is increasing urgency in understanding the basic biology and ecology of raptor species on small islands in Western Pacific. I studied Lanyu Scops-Owl (*Otus elegans botelensis*) on Lanyu. In 25 years, my research team examined its use of food resources, its mortality and survival, inter- and intra-specific competition, and reproduction. Lanyu Scops-Owl is largely insectivorous. There is no known predator on adults, while snakes and rodents could prey on eggs/nestlings. It does not maintain foraging territories. Suitable nesting cavities are limited, and subject to damage by typhoons and tropical rain storms. Intra-specific competition for breeding opportunity is severe. To obtain a good breeding site drives the seasonal distribution and mating system of this species. Successful breeders tend to forego seasonal local migration to remain in breeding habitat year round. Both pair bond and tenure over specific cavities are short. There is no inbreeding and extremely low extra-pair fertilization. This study demonstrates how Lanyu Scops-Owl population adapts to rich food resources but limited breeding opportunities. Conservation of raptor species found only on small islands will require understanding of the constraints affecting their reproduction and survival.

Key words: Lanyu Scops-Owl, *Otus elegans botelensis*, diet, territoriality, reproduction

# The power of occupancy modelling for raptor and owl population studies

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## Abstract

In the 20 years since their discovery, site-occupancy models (MacKenzie et al. 2002, 2003; Tyre et al. 2003) have had a tremendous impact in many branches of biology and their applications, including population ecology and biogeography, and in wildlife management and the analysis of biodiversity monitoring programmes. Typically, occupancy models are applied in cases where a "site" is occupied by an undetermined number of individuals and where therefore all inferences are about presence/absence only, such as in typical species distribution modelling applications. However, right from their beginnings (i.e., MacKenzie et al. 2003), occupancy models have also been applied to the presence and absence of a species in more or less well-defined territories in bird population studies. In this case, instead of mere presence/absence, these models deal with population abundance instead. This is a fundamental quantity in ecology and management alike and the territory-level rates of change over years are then narrowly related to individual-level recruitment and survival rates – indeed, Roth and Amrhein (2010) formulated a model that enables formal inference about the latter from territory occupancy data. I will give a mini-review of the power of occupancy models for raptor and owl population studies and, from my own work or that of colleagues and publications in the literature, give examples for the benefits of occupancy models for this classical type of study. These benefits include correction for imperfect recognition of occupied territories, for incorrect territory state assignment (e.g., occupied by a single bird vs. occupied by a pair), for random or preferential incomplete coverage of territories, and the estimation of individual-level demographic rates from territory occupancy data. I will argue that occupancy modelling belongs to the core analytical skills of anybody investigating raptors or owls in the classical design of a territory-based population study.

# **The Global Raptor Impact Network: A collaboration to monitor and conserve the world's raptors**

Christopher J.W. McClure\*

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## **Abstract**

Raptor researchers can boast some of the greatest conservation successes. Despite such efforts, more than half of raptor species have declining global populations; nearly one third of raptors are threatened or near-threatened; and 17 species are critically endangered. In response to the sixth mass extinction, better monitoring and increased collaboration are clearly needed to avoid population decline and extinction of raptors. The Global Raptor Impact Network (GRIN), a project of The Peregrine Fund, provides tools for raptor researchers to conduct their own studies while collaborating to monitor and conserve the world's raptors. The GRIN mobile apps are available for both iOS and Android platforms. These apps increase the efficiency of raptor researchers by helping them collect data from nest studies, mortalities, aerial surveys, migration counts, mark-recapture studies, dietary surveys, and behavioural observations. The GRIN mobile apps are especially useful for road-based counts of raptors, with over 200,000 km of road surveys conducted using these apps. Users of the GRIN apps can download their own data either from their phones or an online portal. Researchers can also join GRIN by contributing data in any convenient format including Excel files, Google Sheets, field notes, and relational databases. Contributors to GRIN retain ownership of their data and can mark it as confidential. Such confidential data will only be available to GRIN staff and direct collaborators. GRIN also considers data regarding nests and threatened or sensitive species as confidential. Further, GRIN institutes a data policy where if data from any contributor constitute at least 10% of data used in any analysis, that contributor must be invited to participate as a co-author in any publication resulting from that analysis. The analyses conducted by GRIN scientists are specifically designed to affect the listing of species on the International Union for the Conservation of Nature's (IUCN's) Red List. GRIN is already affecting the Red List by, for example, redrawing the ranges of the Harpy (*Harpia harpyja*) and Philippine Eagles (*Pithecophaga jefferyi*). GRIN scientists have also developed models specifically for estimating trends in road-based counts of raptors, and to estimate monthly distributions of species from telemetry data. The global raptor research and conservation community must work together to preserve raptor populations in perpetuity. By pooling data from disparate programmes into a single system to monitor the world's raptors, GRIN can enhance collaboration between raptor researchers and help save raptors from population decline and extinction.

Key words: Collaboration, data collection, mobile application, Red List, road survey, technology, telemetry

# What are the next steps for conserving migratory raptors in the East Asian Flyway?

Ding Li Yong\*

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## **Abstract**

The East Asian Flyway, which connects the region's varied ecosystems between the Russian Far East and the Indo-Australian Archipelago, is travelled by nearly 30 raptor species on their migrations and recognised as among the world's most speciose migratory systems. Although data poor in many respects, the migration ecology and journeys of several long-distance migratory species is increasingly well known, aided by novel tracking technology, and targeted counts at several migration bottlenecks across East and Southeast Asia. On the other hand, much remains to be learnt on the (winter) ecology and long-term (regional) population trends of migratory raptor species, impeding targeted conservation efforts. Faced with threats as diverse as habitat loss to rapid energy infrastructure expansion and unsustainable agriculture, it is possible that several species are already suffering wider declines without them being detected, given the paucity of long-term data. In this talk, I review recent advances in migratory landbird studies in the EAF and highlight knowledge gaps on the ecology of migratory raptors in this flyway. I will offer a brief horizon scan on what are the most important research gaps with conservation implications that merit urgent attention. I then review international and regional frameworks and case studies that can benefit the conservation of migratory raptors in the EAF.



# **Integrating avian medicine into raptor research and conservation**

Jalila Abu\*

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## **Abstract**

Injured raptors being sent to the veterinary hospitals and clinics by the public are not uncommon and the type of injuries can range from mild to severe. Wing fractures can be treated using certain methods. The cause can range from vehicle collision, window collision, and other related injuries. Chances of survival vary and are related to the severity of the injury or diseases. Working in avian medicine and surgery for the past 25 years, I will be sharing my experiences on treating injured raptors in Malaysia and the importance of rehabilitation process to ensure higher survival of these raptors. I will also discuss the fate of raptors that could not be returned into the wild and how to work together with local communities and government agencies in improving raptor research and conservation. The imminent environmental impact and emerging zoonosis affecting raptors in Southeast Asia are also presented with reference to the concept of one health. The potential research questions pertaining to raptor conservation and veterinary medicine are discussed.

Key words: Avian medicine, raptors, orthopedic, rehabilitation, one health

# **ABSTRACTS**

## **Country Reports**

# ARRCN country report 2022: Japan

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## Abstract

Here are some recent topics on raptor conservation in Japan.

1. In August 2021, the Ministry of the Environment set the number of pairs and the breeding success rate as national goals in order to embody the conservation and breeding project that has been promoted for the purpose of conserving Golden Eagles. As numerical targets, 206 pairs were set as the nationwide target number of pairs to maintain the inhabitation. The breeding success rate was set at 36.17%, which is expected to be stable in the future for the Golden Eagle population (target number of pairs, 206 pairs) nationwide by the population viability analysis (PVA). And the candidate areas for promoting habitat improvement were announced as a map. From now on, specific measures such as efforts to improve the foraging habitat in each region will be examined and implemented toward these set goals.
2. In October 2021, the 2<sup>nd</sup> International Grey-faced Buzzard Summit was held in Miyako island, following the first event held in Tochigi Prefecture in 2019. Miyako island is an important relay point for the migration. The conference was attended by remote participants from Taiwan's Kenting National Park Administration Headquarters and the city of Sanchez Mira in the Philippines also. The population of Grey-faced Buzzards in Japan continues to decline, and need to make long-term international conservation efforts across national borders. Also, like "Miyako's Grey-faced Buzzard Culture", the habitat in each region is deeply linked to human activities. Therefore, the convention declaration was issued, "It is important to conserve the natural environment in rich biodiversity where Grey-faced Buzzards live and to make use of it for a sustainable community development."
3. In November 2021, volunteers from all over Japan gathered on Amami Oshima, where many grey-faced buzzards are expected to overwinter, and the simultaneous counting survey of wintering individuals was conducted. The survey was conducted for 3 days with 56 participants on the islands with a circumference of 461 km and an area of 712 square kilometres. The survey was conducted as a visual and vocal hearing survey on a 2km route at one location on foot and conducted in total of 156 locations. As a result, the total number of overwintering individuals was estimated to be 2,066 as a provisional value. In the next year, a count survey is planned to improve the accuracy and also to observe with the local residents.
4. 72 pairs of 165 individuals (as of 2017, 72 pairs x 2 + the number of labelled chicks) of Blakiston's Fish-Owl have been confirmed in Hokkaido. Approximately 70% of wild individuals protected and housed due to injury or illness since 1986 are tagged, and this tagging survey has obtained important data related to the status of movement and dispersion of individuals and the understanding of their age. In 2021 from May to July, leg rings had been attached to 37 chicks in 28 nests. As a result, a total of 658 birds have been attached since the labelling survey was started in 1985. The conservation efforts include feedings and nest box installations, surveys of habitat, releases of birds for reintroductions to the wild, formations of outdoor mating, and preventive measures against traffic accidents.

5. Approximately 1,400-1,700 individuals of Steller's Sea-Eagle have overwintered, mainly in eastern Hokkaido. About 700 to 900 individuals of White-tailed Eagles have wintered in Hokkaido and northern Honshu, and the number of nesting sites in Hokkaido has been increasing since the 1990s. About 170 nest-sites of White-tailed Eagles have been confirmed, but their reproductive performance has deteriorated considerably. In 2005, the national government formulated a conservation and breeding project plan for both species and is working on conservation projects. The main factors that threaten the habitat are collisions with wind power generation facilities and trains, electric shock accidents, lead poisoning due to a foraging shot dead Sika Deer, reduction of nesting forests, roosting forests, food resources due to development, etc. The main conservation measures include surveys of overwintering populations and food resources, behavioural follow-up surveys using GPS loggers, and protection and treatment of injured individuals, rehabilitation. In addition, the cause of the accident has been investigated and measures have been taken to prevent the accident.

Key words: Golden Eagle, Grey-faced Buzzard, Blakiston's Fish-Owl, White-tailed Eagle, Steller's Sea-Eagle

## Raptor research and conservation in Korea

Hankyu Kim<sup>1\*</sup>, Yu-Seong Choi<sup>2</sup>, Wee Haeng Hur<sup>2</sup>, Seung-Gu Kang<sup>3</sup> and Chang-Yong Choi<sup>4</sup>

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### Abstract

The Republic of Korea (hereafter Korea) is home to about 20 breeding raptor species and 29 other species that only occur during the non-breeding season, either migrating through winter or occur as a vagrant. Many migratory raptor species breed in Korea migrate to Southeast Asia for wintering. We summarized Korea's raptor research and conservation activities in the past five years (2017-2021). To summarize recent raptor research done in this period, we reviewed research articles from the Korean Journal of Ornithology and Google Scholar with a set of keywords. In addition, we used the Research Information Sharing Service operated by the Korean Ministry of Education, Science and Technology to search for unpublished doctoral dissertations or master's theses from university libraries. We found a total of 30 peer-reviewed journal articles addressing raptor biology in Korea. The most common field of research was natural history (9), describing new records of vagrant species or subspecies, the life cycle of raptor-nest breeding beetles, moult patterns of Japanese Sparrowhawks during the migration in Korea, and more. It was followed by veterinary medicine (7), behavioural ecology (4), genetics (2) and other fields. Notably, veterinary and genomic studies are among the most common research fields in raptor research in Korea. This may be due to the increase in government-funded regional wildlife rescue centres, which can promote veterinary research by increasing wildlife veterinarians in the field of raptor research and the increase in clinical cases and sampling opportunities from rescue centres. Besides published research articles, nine graduate students submitted their final dissertation/thesis in the past five years. Three were breeding ecology and natural history of Oriental Scops-Owls, Tawny Owls, and Eurasian Kestrels in Korea, and three were on veterinary science on raptor rescue and clinical treatments. The last three studies were on the history and art of falconry in Korea. In terms of large-scale development in raptor monitoring and conservation, a new Korean National Migratory Bird Centre was established at Socheong Island in 2019. The centre has launched a regular fall raptor monitoring programme since the fall of 2019. In fall of 2021, the monitoring team at the centre observed migration of 10,545 individual raptors, mostly comprising of Oriental Honey-Buzzards (8,497 birds), in 21 days of observation (September 10<sup>th</sup> to October 28<sup>th</sup>, approximately in 2-day interval). This is the only migration monitoring programme active in Korea at this point and with promising support for consistent and long-term migration monitoring that records annual migrating raptors from Korea, crossing the Yellow Sea in fall.

Key words: South Korea, fall migration monitoring, research summary, Korean National Migratory Bird Centre

# Growing public concern for raptor conservation in Taiwan

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## Abstract

Until 2021, a total of 34 diurnal and 13 nocturnal raptor species have been recorded in Taiwan. Among these species, 9 diurnal and 8 nocturnal raptors have stable breeding records. Population status of most of the breeders remained stable, with a recent trend of population expansion in Black Kite (*Milvus migrans*), Black-winged Kite (*Elanus caeruleus*), and Peregrine Falcon (*Falco peregrinus*). The growing trend in Black Kite might be contributed by the decrease in use of rodenticides and pesticides in the agricultural regions, which has reduced the mortality rate of young and naive kites that frequently consume poisoned carcasses of small animals. Black-winged Kite, occupying a specialized niche to prey on rodents in agricultural lands, might also benefit from a growing public concern for the overdose of environmental toxicants. Although regarded as a migratory raptor in the past, Peregrine Falcons have formed stable breeding pairs with considerably high fledging success in northern Taiwan. Another two resident raptors with possible signs of population expansion are the Black Eagle (*Ictinaetus malayensis*) and Crested Goshawk (*Accipiter trivirgatus*). Sightings on the Black Eagle are growing all around the island including in suburban areas; while Crested Goshawk has dispersed into the cities and became the most dominant raptor in urban areas. Every year since 2014, we broadcasted urban nests of Crested Goshawk on YouTube, providing opportunities for the public to participate in breeding data collection and for raptor conservation education. In 2021, we located a nest of a pair of Oriental Honey-Buzzard (*Pernis ptilorhynchus*), which has attracted public attention and further provide an extremely valuable opportunity to quantify the prey of this highly specialized raptor. On the other hand, annual surveys for migratory raptors have lasted for nearly 30 years in the Kenting National Park, the south-most tip of Taiwan. A standardized protocol has been established for 18 years since 2004, indicating a long-term trend of population growth in the Chinese Sparrowhawk (*Accipiter soloensis*) and Grey-faced Buzzard (*Butastur indicus*) in recent years. Since 2017, RRGT started to provide professional rescue and rehabilitation services for raptors from northern Taiwan. The yearly increase of rescued raptors not only reflects on the public awareness of these birds, but also indicates that the raptors may need further attention. As a conclusion, public concern for raptor conservation has grown in the past decade, which indicates the validity of public education held in recent years.

Key words: Citizen science, population trend, public education, rescue centre, RRGT, Taiwan

# Updates on raptor research and conservation in Vietnam

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## Abstract

Due to the lack of researchers and resources, the study of raptors in Vietnam is limited and are mainly focused on the migration at some identified sites in Northern Vietnam. From 2015-2020, three migration sites at Ba Vi, Tam Dao National Parks and around Hanoi city had been monitored. A total of 82,109 individuals of 13 migratory species have been recorded. One new migration route had been identified (along the Red River). From 2016-2018, we did the surveys along the Vietnam and Cambodia's border to check the status of the critically endangered Red-headed Vulture *Sarcogyps calvus*. From 2018-2020, the ecology studies of two resident species including Pied Falconet *Microhierax melanoleucos* and Rufous-winged Buzzard *Butastur liventer* had been conducted. Four nests of those species have been monitored. On the other hand, bird trade has generally increased in the recent years and in particular, many species of raptors have been trapped and sold in the normal markets and through the internet. Between 2015 and 2021, we have consulted the government of Vietnam to issue two National decrees in order to control the situation. All the raptor species recorded in Vietnam have now been included in the decrees. In particular, some of the threatened species are included in the Vietnam penal code. We have also set up several networks and hotlines to facilitate communications with the Environmental Police and Forest Protection Department in the tracking of illegal raptor traders in the markets and online platforms.

Key words: Raptors, National Decree, *Sarcogyps calvus*, *Microhierax melanoleucos*, *Butastur liventer*

# Philippines: Country report

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## Abstract

In spite of the lockdowns and travel restrictions, and the ban on gatherings and meetings, the study and conservation of raptors in the study areas of Raptorwatch Network Philippines, continue to blaze its path, carried forward by the people in the flyway communities. Local communities in Sanchez Mira and Pamplona, Cagayan Valley, and in Pagudpud, Ilocos Norte, are continuing their campaign to protect a huge spring migration roosting site for Grey-faced Buzzards roosting site there, bringing the long traditional practice of harvesting of the Grey-faced Buzzards to a stop. Over on Mindanao where there seem to be no community practice of traditional harvesting of migratory raptors, communities of Barangay Rio del Pilar, Glan Sarangani, and of Cape San Agustin, Governor Generoso, Davao Oriental are continuing their sustainable community livelihood reforestation projects of the denuded portions of the autumn migration roosting sites for migrating raptors. In late 2019, Raptorwatch Network Philippines explored another important Grey-faced Buzzard roosting area at Nueva Vizcaya, Luzon in cooperation with the Provincial Government, the department of Tourism and the Nueva Vizcaya State University. This roosting site is only about 245 kilometres/150 miles from Sanchez Mira and Pamplona. Initial plans for the 2020 and 2021 Spring migration community educational campaigns were not carried out in full because of the pandemic. Nevertheless, the local tourism office and the University forged forward with some of their plans at each opportunity they could take. With the discovery of this second spring roosting site so close to the first, it is our theory that 2 sets of populations occupy the different roosting sites. Further cooperative studies in cooperation with Taiwan and Japan will bear this out. The COVID-19 pandemic has taught us that the success of our conservation programs depends greatly on the support, and more importantly, the impetus of the local community themselves. It has taught us the importance of educational campaigns to foster and awaken community awareness, appreciation, concern and conservation action. Finally, since raptor migration has no national, political and cultural boundaries, it has taught us the tremendous importance of international support, cooperation and exchange. Without these, Raptorwatch Network conservation projects would not be sustainable.



## Recent raptor-related work in Malaysia

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### Abstract

Over the past two decades, raptor research has been limited within Peninsular Malaysia. Overall, there is a lack of long-term ecological studies on the Malaysian raptors especially in Borneo. The annual migration count made at Tanjung Tuan that commenced in 2000 remains as the only source of long-term data for northbound migratory raptors, with varying count efforts from the nearly full-season counts in 2009 and 2010 to shorter surveys of two weeks in the past seven years. A wide scale survey of Peregrine Falcon (*Falco peregrinus ernesti*) on the limestone hills in Peninsular Malaysia had located at least 36 occupied sites in 2019. The detailed observations of nesting activities of the Peregrine Falcon, Black-thighed Falconet (*Microhierax fringillarius*) and Grey-headed Fish-Eagle (*Ichthyophaga ichthyaetus*) have continued for more than a decade since 2008 in Perak, including a recent encounter of breeding Indomalayan Honey-Buzzard (*Pernis ptilorhynchus torquatus*). The dietary study of Black-thighed Falconet based on morphological examination of prey items was made prior to genetic method. In the case of nocturnal raptors, Barn Owl (*Tyto alba javanica*) remains as the most widely studied owl species with recent work on its movements, diets and sexing for birds being introduced in different parts of Peninsular Malaysia. A study that estimated the density of owls in the oil palm smallholdings in Selangor had been made with some records of forest owl species. A record of a breeding pair of the Reddish Scops-Owl (*Otus rufescens*) in a forest in Selangor has facilitated acoustic sexing of the owl in addition to home range estimation via radio-telemetry. An attempt to assess vocal activity patterns of nocturnal forest raptors as well as their breeding using nest boxes and video surveillance had to be halted due to the COVID-19 pandemic. Overall, research on raptors is still limited in Malaysia and there is a need for more work to be done on the ecology of many raptor species in the country.

Key words: Raptor research, ranging behaviour, activity pattern, diet, bioacoustics

## Country report – Singapore

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### Abstract

A total of 47 raptor species occur in Singapore, 36 species being diurnal and 11 species nocturnal, a surprisingly good diversity despite the small size of the country. The most common migrant raptor is the Oriental Honey-Buzzard *Pernis ptilorhyncus*. Other common migrants include the Japanese Sparrowhawk *Accipiter gularis*, Black Baza *Aviceda leuphotes* and Chinese Sparrowhawk *Accipiter soloensis*. Being at the end of the Thai-Malay Peninsula, Singapore benefits from its location at the ‘end of the funnel’ and has a disproportionate number of records of migrant raptors very rare elsewhere in the peninsula. These include the Lesser Kestrel *Falco naumanni*, Besra *Accipiter virgatus*, and Himalayan Vulture *Gyps himalayensis*. A few species of raptors never recorded before have been seen in recent years. They include the Shikra *Accipiter badius*, which is scarce south of Thailand, and the Brown Fish-Owl *Ketupa zeylonensis*, rarer still, and for which the nearest known site is some 600km north of Singapore. Amazingly, the Brown Fish-Owl was found to be in the company of a Buffy Fish-Owl *Ketupa ketupu* and they appeared to have produced a hybrid offspring. The common resident raptors are the White-bellied Sea-Eagle *Haliaeetus leucogaster*, Brahminy Kite *Haliastur Indus*, Changeable Hawk-Eagle *Nisaetus cirrhatus*, Sunda Scops-Owl *Otus lempiji* and Brown Hawk-Owl *Ninox scutulata*. Some resident raptor species have adapted well to the urban landscape and taken to nesting in urban parks and gardens, and even on roadside trees. They include the Crested Goshawk *Accipiter trivirgatus* which also demonstrated similar adaptability in other countries, and the Buffy Fish-Owl. The first record of the nesting of the locally rare Crested Serpent-Eagle *Spilornis cheela* was only obtained in 2021. Advances in digital photography have made it easier to capture photographs of magnificent raptors, which in turn have led to an increase in interest in raptors. Coupled with raptor watch events, there is a steadily growing community of raptor lovers eager to spend time at a fixed location under the elements watching and photographing raptors. The photographs obtained are an important resource especially for the records of rare raptors.

Key words: Singapore, raptor

# Updates on raptors in Indonesia: Conservation status, conservation actions and migration

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## Abstract

Indonesia is an archipelagic country, situated between the continents of Asia and Australia. This unique position gave rise to the biodiversity and endemism observed in Indonesia, including in raptor species. A total of 76 species of raptor are protected by Indonesian laws through the Ministry of Environment and Forestry Regulation in 2018, covering 66 species from the *Accipitridae* family and 10 species from the Falconidae family. They are either sedentary or migratory species. This report will highlight the recent state of both migratory and sedentary raptor species in Indonesia with particular focus on their conservation status and efforts. For the sedentary species, this report will highlight the conservation efforts of two endemic raptor species in Indonesia including the endangered Javan Hawk-Eagle *Nisaetus bartelsi* and the critically endangered Flores Hawk-Eagle *Nisaetus floris*. An update on their distribution will also be discussed. Indonesia is also an important area for migratory raptor species, in which they regularly visit Indonesia through the East-Asian Continental Flyway and the East-Asian Oceanic Flyway. The Oriental Honey-Buzzard *Pernis ptilorhynchus orientalis*, Chinese Goshawk *Accipiter soloensis* and Japanese Sparrowhawk *Accipiter gularis* are among the common migratory raptors to Indonesia. Through this report, the annual monitoring activities conducted in Indonesia for the migratory raptor species will be presented, i.e., species, number, planned events. The published materials (i.e., scholar articles, books) that have been yielded from numerous raptor studies in Indonesia will also be presented in this country report.

Key words: Conservation, migration, raptor, sedentary, status

# Raptor research and conservation in Nepal

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## Abstract

Nepal is an important landmark for raptors, supporting 60 species of diurnal and 21 species of nocturnal raptors. The high occurrence of raptor species in Nepal is due to the great variation in topographic features (elevations of 76 m to 8848 m) and habitat conditions. Among 10 Important Bird Areas (IBAs) in the world that support significant species of threatened raptors, seven are found in Nepal. Despite this, very little priority has been given for the conservation of raptors in the country. Here in this paper, we summarize the recent raptor research and conservation in Nepal. With an aim of understanding the population status of the endangered Steppe Eagle and other raptors, a long term monitoring of migrating raptors from the flyway (at Thoolakharka) has been conducted since 2012. The study found that the numbers of migrating Steppe Eagle in Thoolakharka watch site is declining, while the population of Himalayan Vulture is stable. Telemetry-based study showed that Himalayan Vultures breeding in Tibet and central China travel to the south, crossing the high Himalayas of over 7500 m altitude and wintering in the south of Nepal and central India. A study of the globally declining Bearded Vulture in the Annapurna Himalayan region in 2016 estimated 0.184 individuals/km<sup>2</sup> and home range studies showed age class difference exists, i.e. adult birds have a smaller home range compared to immature wandering vultures. Ecological information on the rarest eagle species, the Mountain Hawk Eagle and Indian Spotted Eagle, which are adapted to high-quality forests and lowland flood-prone habitats, respectively, are unknown to us. To unveil the mystery of its movement, diet and breeding biology, studies were carried out from 2018 (ongoing) but have yet to obtain a significant amount of data. For the first time, artificial nests were built in five breeding territories of Indian Spotted Eagle, since their nests often get blown away by wind. One of the nests was used by the White-eyed Buzzard. Energy development infrastructures such as power transmission line poles are undermined threats to raptors in Nepal. The first ever survey of electrocution and collision was conducted in Nepal to study the mortalities of raptors and other birds by such energy infrastructures in five places in Nepal. Ten species of raptors including vultures, eagles, buzzards, kites and owls were recorded based on mortality with the rate of average 1.4 birds/100 power poles. Conservation often becomes effective and gets success when they are implemented on grass-root level. Training on organic farming and use of integrated pest management were provided to the farmers at the southern belt of Nepal and awareness programs have been conducted in high schools. Search and monitoring of vulture's and eagle's nests and management of vulture restaurant are still ongoing since 2007. To protect and manage owl habitats and increase their populations in Nepal, the owl action plan for 2020-2029 was prepared by Friends of Nature in collaboration with Department of National Park and Wildlife Conservation. Birdlife Nepal has been continuously monitoring colony of vulture's nests (*Gyps* spp.) as well as vulture's population. They have started captive breeding of *Gyps bengalensis* from 2008 and have released 34 individuals (captive reared and captive born) till date. Up to end of 2021, 75 out of 77 districts of Nepal have been declared as a vulture safe zone.

Key words: Migrating raptors, satellite tagging, vulture, eagle, electrocution and collision, action plan, captive breeding, vulture safe zone

# **ABSTRACTS**

## **Concurrent Session 1**

# Habitat use of roosting site and movement pattern of Australasian Grass-Owl

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## Abstract

Australasian Grass-Owl (*Tyto longimembris pithecops*) is the only resident owl species distributed in non-forest habitats in Taiwan. Because of its endangered status, recent efforts have been focused on understanding its distribution and breeding ecology, as well as identifying threats. Recently, with the advancement in satellite telemetry, we were able to explore the habitat use and movement pattern of this elusive species. We satellite-tracked 22 individuals during January 2018 to March 2021, and 17 of them had tracking records longer than one month. The longest tracking record was 434 days. While 68% of roosting sites were used only once, some individuals used the same site repeatedly, up to 25 days. While 92.5% of the time the movements were within 2 km, some juvenile female Grass-Owls tended to performed long distance movement (up to 79.3 km in one night) during the early breeding season, presumably to look for males with breeding territories. The daily movement between roost sites varied with the average of  $0.69 \pm 0.58$  km (n=16). The most frequent land use types of roosting site were grassland, followed by military base and agricultural land. The dominant vegetation covers of the roosting sites were *Imperata cylindrica* var. *major*, which had the tallest average height and vertical cover, compared to other grass types. Based on data from 6 individuals, movement patterns at night varied among individuals and the average daily movements ranged from 0.5 to 11.2 km<sup>2</sup>. More information is needed to understand the variation between sex and age.

Key words: Satellite tracking, roosting site, movement pattern, habitat use

# Factors influencing habitat-use of owls in and around Community Reserves in Meghalaya, north-east India

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## Abstract

Understanding the factors determining distribution of species is fundamental for undertaking conservation measures. This information is largely unknown in tropical owls, even those in India. North-east India, located in a global biodiversity hotspot, is home to 20 species of owls. However, the region currently experiences a plethora of anthropogenic pressures. Here, the Protected Area Network largely comprises Community Reserves, which are Community Conserved Areas. Our study assessed the factors (vegetation, terrain and spatial variables) influencing the occupancy and abundance of owls in and around Community Reserves in Meghalaya, north-east India. We also tested whether Community Reserves are acting as refugia sites for owls. To address the first aim, we overlaid 4 km<sup>2</sup> plots, divided into 16 grids of 500x500m each around four Community Reserves in Garo Hills, Meghalaya. Using alternate grid sampling, we surveyed 33 grids in January-March, 2020. Owl surveys for 13 species involved initial quiet listening, call playback and spotlight searches after sunset, during which we also collected sampling covariates. Owl surveys were replicated thrice in each grid. To address the second aim, data from the aforementioned survey and owl surveys at 32 points conducted in and around Community Reserves of Garo and Khasi Hills in February-April 2019 were used. We collected vegetation parameters from the field, and extracted spatial and terrain factors from Digital Elevation Models and Google Earth. To assess the effect of these factors on occupancy and abundance of owls, we used single-species single-season occupancy models and N-mixture models respectively. We used Mann-Whitney *U* tests to test whether owl species detections were significantly different inside and outside Community Reserves. We found that wind speed, temperature, humidity and survey start time influenced the detection probability of owls. Occupancy and abundance of Brown Wood-Owls (BWO) were influenced by slope (-), distance to stream (-), girth (+) and height heterogeneity (+) of trees. Mountain Scops-Owl (MSO) occupancy and abundance were influenced by distance to stream (+) and disturbance (+) (an index created by summing scores given for felling, lopping, recent fire and grazing). Slope was the only variable that had a substantial effect (+) on the occupancy and abundance of the Collared Owllet (CO). We detected BWOs, Collared Scops-Owls and Asian Barred Owllets higher inside Community Reserves and these differences were statistically significant. Species-specific thermoregulatory strategies and prey distribution likely explain the influence of distance to stream and slope on owls. BWO's positive relationships with tree girth and height heterogeneity reflect the need for large trees with cavities and roosting-sites at variable heights, which play a role in behavioural thermoregulation. Positive relationship of MSO with disturbance was unexpected, since it is described as a dense evergreen forest species. Our study highlights the need to protect streams and Community Reserves as refugia sites for owls in Meghalaya. We believe Community Reserves are especially important for BWO, an old-growth forest species thought to be in decline, since these reserves are among the few areas containing old-growth forests in the landscape.

Key words: Owls, habitat correlates, refugia site, Community Reserve, occupancy, abundance, modelling

# Nest site selection of Black Kites (*Milvus migrans*) in Pingtung, Taiwan

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## Abstract

The population of Black Kites (*Milvus migrans*) in Taiwan, once common and widespread, dropped dramatically possibly due to secondary poisoning in the past few decades, with only 272 individuals in 2013. As the promotion of eco-friendly farming continues to grow, the population slowly recovered to 800 individuals by the time of 2020, with about 300 individuals in southern Taiwan. In order to identify their key habitat, we revisited all past breeding records, searched for new breeding pairs within their distribution, often spending several days to observe one breeding pair to find its nest. These nests were usually found in fragmented lowland forests, which form landscape mosaics with farmlands and human activities nearby. During the breeding season of 2021, we recorded a total of 30 Black Kite nests in Pingtung of southern Taiwan. We analysed nest site selection by comparing kite nests with random selected sites in landscape (5 km) and territory scales (500 m). Black Kites selected broadleaf forests ( $p = 0.01$ ) that were closer to streams ( $p = 0.04$ ) as nest sites in both scales. Sites with higher NDVI ( $p < 0.0001$ ) and closer to the edge of large forest matrices ( $p = 0.01$ ) were chosen in landscape scale. However, sites closer to human settlement were selected in territory scale ( $p = 0.04$ ). High productivity, distance to water and access to human resources possibly indicate a higher accessibility of food resources for these generalists during breeding season. Land type composition varied greatly in both scales and could be associated with the generalistic behaviour and their ability to have different food habits in various environment. Our results showed how different variables affect the nest site selection of a synanthropic raptor in different spatial scales. This also can be applied to further habitat-modelling studies and useful in the conservation measures of the target species in Taiwan.

Key words: *Milvus migrans*, breeding habitat, habitat selection, raptor, landscape



# Nesting of Jerdon's Baza *Aviceda jerdoni* in Phetchaburi Province, Western Thailand

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## Abstract

The breeding ecology of Jerdon's Baza *Aviceda jerdoni* is little known in Thailand and Southeast Asia. The species is a partial migrant in the region. A resident population breeds in Northeastern, Southern and Western Thailand. The nest was monitored for 10 days in July 2021. The nest was found in a dry evergreen forest at Kaeng Krachan district, Phetchaburi province, Western Thailand (location: 12.801758; 99.482843 elevation: 371m). The nest was built with small dry sticks approximately 30 cm in length and placed on the Buddha Coconut tree (*Pterygota alata*) with a 36-meter height above the ground. The nestling was estimated to have hatched on 30 May 2021, and successfully fledged in the evening of 11 July 2021, hence the nestling period was approximately 43 days. The species is dimorphic, thus sexual identification was possible to determine that both parents share-brooded. Prey was delivered using the parent's beak to the nest, and 128 attempts were recorded. Prey types were identified in 69 attempts. Prey composition comprised lizards (40.5%), insects (26.2%), mantis (17.4%), green caterpillars (14.5%), and snakes (1.4%).

Key words: Jerdon's Baza, nest, prey composition

# Observations on the nesting of the Oriental Honey-Buzzard *Pernis ptilorhyncus torquatus* – Tweeddale morph in Ipoh, Perak, Malaysia

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## Abstract

Oriental Honey-Buzzard *Pernis ptilorhyncus* is a polymorphic raptor with highly variable plumage of which two subspecies are known to occur in Malaysia. *P. p. orientalis* occurs as a migrant in large numbers in Peninsular Malaysia during the northern winter. *P. p. torquatus* (including “Tweeddale Morph”) is an uncommon resident of forest and forest edge in the lowlands and sub-montane areas. In 1998 a pair of *P. p. torquatus* took up residence in the grounds of a golf club in Ipoh, Perak in Peninsular Malaysia and subsequently the pair nested a total of 13 times from 1998 to 2008. The pair produced a total of 17 chicks but only 12 chicks survived and fledged successfully. Thereafter the male partner never appeared again and we did not come across anymore nesting (Observations on the above nesting observations up to 2005 was presented by the 1st author at the 4<sup>th</sup> ARRCN Symposium). In another sighting at the end of December 2020, two members from MNSPBG noticed a male and a female of *P. p. torquatus* – Tweeddale morph breaking branches to build a nest in the grounds of a closed down cinema. This paper presents the results of observations by using binoculars including taking of digital photographs and digital videos. Observations were carried out by 11 MNSPBG members for 3–4 hours duration, 2–3 times a week during nest building and incubation stage and then twice daily from egg hatching to chick fledging. Notes on nest building, incubation, development of young, diet and breeding success are reported. The nest was built 40 feet high on a Rain Tree (*Albizia saman*) in the compound of a closed down cinema hall beside a busy traffic light intersection surrounded by houses, shops and a wet market nearby. Both adults were observed breaking off branches from the nest tree itself as well as other trees within 200 m distance. The adult pair continued adding more branches to the nest almost daily throughout the whole nesting period. Incubation period to egg hatching was 35 days. Both parents took turns in incubation duties as well as accompanied the single chick in the nest but the female played the major role. Food and prey brought back by both parents for the chick were honeycomb, hornet’s nest (once), bird nestlings and ducklings. The chick was able to eat from the honeycomb on its own from 35 days old and bird nestlings from 39 days old. At about 32 days old, the adults started to leave the chick alone in the nest but stood guard nearby. The chick was left unguarded from 41 days old and successfully fledged at 54 days old.

# Breeding biology, social interactions and conservation of the semi colonial Montagu's Harrier in the Spanish Extremadura

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## Abstract

Montagu's Harrier (*Circus pygargus*) is a medium-sized, semi-colonial migratory raptor that breeds from Western Europe to Asia. Birds from Western Europe fly to the Sahel to overwinter and come back to their breeding sites in April. Montagu's Harriers are food generalists, feeding on small mammals, small birds, reptiles and insects. This ground nesting species (mainly in cereal) is increasingly dependent on conservation programmes during breeding all across Europe. Main threats are predation, loss of natural habitats, loss of clutches and brood due to harvesting activities in agricultural land, and the use of pesticides which reduce prey populations (Arroyo et al. 2004). The population in the Spanish Extremadura, one of the major breeding areas of Montagu's Harrier in Europe, suffered a steep decline from about 1,000 breeding pairs in 2006 to about 600 breeding pairs in 2017 (Arroyo et al. 2019). On the basis of long-term and extensive data (2001-2017; >1700 breeding attempts observed in an area with active nest protection campaigns) we assessed factors influencing breeding biology and breeding success/failure. In spite of nest protection measures we found a significant trend for productivity decrease over the 17-year study period. In particular, increasingly laborious conservation strategies had to be adapted to meet an increased predation pressure by red foxes. We used GPS-GSM tags deployed on 10 adult females and 3 adult males to study movements within the breeding season. We found that males used large home range areas to provide food to the females and fledglings. Data over multiple seasons showed site fidelity to nesting site and home range area for males and most females. We found social interactions both within the colony and between different colonies: non-breeding females were active in defending nests in the colony against predators, other females visited colonies further away and possibly helped in breeding attempts of other pairs (nest adoptions). In 2021 we tagged 9 juveniles to study dispersal of the species. Preliminary data showed that two were predated soon after fledging, while the remaining seven explored different sites in Spain before starting their migration to Africa.

Key words: *Circus pygargus*, Extremadura, ICARUS, GPS-GSM tags, conservation

# Vocal activity of the Changeable Hawk-Eagle (*Nisaetus cirrhatus*) in Peninsular Malaysia

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## Abstract

Raptors are charismatic species and often play a critical role in ecological functions, but studies on their behaviour are lacking especially for forest species that reside in habitats that are difficult to access. In Malaysia, most raptor behavioural studies in terms of vocalisation were done on nocturnal raptors. This study thus aimed to provide preliminary findings on the vocalisation and vocal activity pattern of a common raptor, the Changeable Hawk-Eagle (*Nisaetus cirrhatus*). The study was conducted in a lowland forest reserve, the Ayer Hitam Forest Reserve in Selangor, Malaysia, in April 2021. Automated bioacoustics recorders were placed for six days in five different sites to passively collect the eagle's vocalisation. From a total of 720 recording hours, the Changeable Hawk-Eagle uttered at least three call types which often peaked late morning to early afternoon (1000 – 1400 hr). They usually called after sunrise (0700 hr) with the last call heard in the evenings (1600 hr). Specific functions of the call are unknown but may relate to territorial defence or conspecific communication. Findings made in this study may provide improvement in diurnal raptor survey methods as well as filling the gap on vocalisation of raptors in Malaysia.

Key words: Vocalisation, temporal variation, raptor, forest habitat, Ayer Hitam Forest Reserve

# Ecological niche model reveals the differential space use by sympatric raptors of the Andaman archipelago, India

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## Abstract

Understanding the habitat use among sympatric raptor species is a prerequisite for conservation and management. The Andaman Serpent-Eagle (*Spilornis elgini*), Crested Serpent-Eagle (*Spilornis cheela*), and Changeable Hawk-Eagle (*Nisaetus cirrhatus*) are sympatric raptors found in the Andaman Islands. Among the three, competition between *S. elgini* and *S. cheela* is reportedly higher, so range expansion of *S. cheela* may reduce the extent of available habitat to the endemic *S. elgini*. However, the interaction of *N. cirrhatus* with other sympatric species is not documented. In this context, we predicted the potential distribution range of these species using the MaxEnt algorithm and the extent of overlap between them using a set of spatial variables and foraging perch locations (functional use). Surveys were conducted in all available paved and unpaved roads in four major islands of Andaman (North Andaman, Middle Andaman, Baratang, and South Andaman) between December 2015 and June 2017 with a total survey effort of 421 days. We recorded all perch locations using hand-held GPS and those locations were used for model predictions. Fourteen ecogeographical variables were extracted from both LANDSAT-8 and ASTER-DEM images and retained only nine uncorrelated variables for further analysis. We recorded 348, 127, and 157 perch locations of *S. elgini*, *N. cirrhatus*, and *S. cheela*, respectively, in the Andaman Islands and those locations were spatially thinned. The proportion of potential area for endemic *S. elgini* (63.06 %) in the Andaman archipelago was higher than the widespread *S. cheela* (37.18%) and *N. cirrhatus* (19.96%). The model output reveals that the preferred perch locations of *S. elgini*, *N. cirrhatus* and *S. cheela* differed. The endemic *S. elgini* preferred evergreen forest while *S. cheela* and *N. cirrhatus* preferred coastal mangroves and agriculture fields, respectively. The overlap between *S. elgini* and *N. cirrhatus* was higher in agriculture fields but temporal usage of agriculture fields by *S. elgini* minimizes the overlap. Our study revealed that the raptors are well adapted to minimize competition between sympatric species through clear niche segregation. Alternation of evergreen forests would reduce the extent of potential habitat endemic and threatened *S. elgini* and increase the competition with other widespread raptors of the Andaman Islands.

Key words: Raptors, Andaman, evergreen, competition, niche overlap, MaxEnt

## **Factors influencing the occurrence and abundance of owls in Western Ghats, India**

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### **Abstract**

Factors influencing the occurrence and abundance of birds are basic goals in ecology yet such studies are either insufficient or not available for most of the nocturnal raptors in India. This study provides the first baseline data on the factors influencing the occurrence and abundance of owls in the Western Ghats, a biodiversity hotspot. Point count method was followed in 276 points over 24 forest stations. Six hundred and eighteen owls belonging to 13 species were recorded with a mean abundance of 2.48 owls/point. Points that fall in low elevation (>750 m), dry deciduous and scrub forests, close to human habitation and moderate slope had a high richness of owls. Similarly, points that fall in high-altitude (>750 m), moist deciduous forests with low slopes and close to human habitation had a high abundance of owls. nMDS plot revealed a west to the east pattern (Rainfed to Rain shadow; longitudinal pattern) in owl abundance across forest stations but no pattern was obtained along the south to the north (latitudinal trend). Deciduous and scrub forests, found in low elevation and non-protected areas of the eastern slopes, are acting as key habitats for many of the larger owls while it was moist deciduous forests in the western slopes for lesser owls. Our study demonstrated that species richness of owls in a forest station represents the availability of diverse eco-climatic zones (both altitude and vegetation types) and hence, species richness of owls can be considered as surrogate to address biodiversity issues at landscape level in the Western Ghats.

Key words: Southern Western Ghats, larger owls, hillocks, conservation of owls, abundance, rainfall pattern

# Nest observation of Black-thighed Falconet in Phetchaburi Province, Western Thailand

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## Abstract

Black-thighed Falconet *Microhierax fringillarius* is the smallest diurnal raptor in the world. Its habitat is mainly in forests with large trees, and its range includes Western Thailand, Peninsular Malaysia, Singapore, Indonesia and Brunei Darussalam. Nesting ecology of Black-thighed Falconet is little known in Thailand. The species is a breeding resident in southernmost western Thailand southward to the Malay Peninsula. One nest was studied at Kaeng Krachan National Park, Phetchaburi Province, western Thailand. Observation was made, with 8x42 binocular and 25-50x65 telescopes between 1 and 3 June 2009. Photographs and videos were taken by a digital camera with 500mm telephoto lens. The nest was in a living *Melia azedarach* tree, 7 m high from the ground and the nest entrance was 4 cm wide. Preys were identified on 17 attempts. Prey comprised butterflies (38.9%), small birds (11.1%), grasshopper (5.6%), carpenter bee (5.6%) and unidentified preys (27.8%). After catching small birds, the male passed the de-feathered bodies to the larger-sized female who shredded them into small pieces and fed them to the chicks in the nest. Three adults were seen in front of the nest and were presumed to be juveniles of the previous year as Black-thighed Falconet is likely to have cooperative breeding behaviour which means immature birds of previous broods would continue to live in the same nest with adults as documented in its congener Collared Falconet. It nests in old barbet or woodpecker tree holes due to lack of ability to penetrate wood.

# **ABSTRACTS**

## **Concurrent Session 2**



# **The Global Anthropause Raptor Research Network: How raptor research during the COVID-19 pandemic provides invaluable opportunities for conservation biology**

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## **Abstract**

Research is underway to examine how a wide range of animal species have responded to reduced levels of human activity during the COVID-19 pandemic. In this talk we will outline why raptors are particularly well-suited for investigating potential ‘anthropause’ effects: they are sensitive to environmental perturbation, affected by various human activities, and include many locally and globally threatened species. Lockdowns likely alter extrinsic factors that normally limit raptor populations. These environmental changes are in turn expected to influence – mediated by behavioural and physiological responses – the intrinsic (demographic) factors that ultimately determine raptor population levels and distributions. Using this population-limitation framework, we present a range of research opportunities and conservation challenges that have arisen during the pandemic, related to changes in human disturbance, light and noise pollution, collision risk, road-kill availability, supplementary feeding, and persecution levels. Importantly, raptors attract intense research interest. Many professional and amateur researchers running long-term monitoring programmes, often incorporating community-science components, advanced tracking technology and field-methodological approaches that allow flexible timing, enabling continued data collection before, during, and after COVID-19 lockdowns. The newly formed ‘Global Anthropause Raptor Research Network (GARRN)’ aims to tackle ambitious analyses across geographic regions, ecosystems, species, and gradients of lockdown perturbation. We operate an inclusive collaboration model where data owners are offered co-authorship on publications featuring their data contributions to mobilize the international raptor research community. Over the past few months, our initiative has teamed up with the ‘Raptor and Raven’ sub-project of the Bio-Logging Initiative who focuses on raptor movement worldwide (including vultures, owls and corvids). While they have already been offered over 75 datasets for 38 species, they are keen at this stage to broaden the taxonomic and regional coverage of their database to enable comprehensive comparative analyses. Furthermore, within GARRN, we will then investigate lockdown effects on raptors more broadly (collating data on diet composition, pollutant measured in biomarkers, occupancy, productivity, mortality rates and population levels etc.). Finally, GARRN has partnered with the Peregrine’s Fund ‘Global Raptor Impact Network (GRIN)’ to manage data submissions and

organizations for analysis. With these strong partnerships, we will ensure that any hard-earned data set will not only help to examine effects of anthropogenic disturbance on raptors, but also to monitor the world's raptors and to calculate the metrics used by the IUCN Red List when judging whether a species is threatened with extinction. Under the most tragic of circumstances, the COVID-19 anthropause has afforded an invaluable opportunity to significantly boost global raptor conservation.

Key words: Anthropause, before-after-control-impact (BACI), birds of prey, human disturbance, human-wildlife interactions, lockdown, natural experiment

# Climate change leads to range contraction for the “Hachikuma” raptors: How to point out future conservation strategies?

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## Abstract

Over the past decades, global environmental changes have led to unfavourable effects on migratory birds. However, many species that encounter climate change are listed as Least Concern by the International Union for Conservation of Nature. Using ecological niche models, we quantified the redistributions of breeding and wintering sites of Oriental Honey-Buzzards (i.e., hachikuma), an overlooked long-distance migratory raptor under changing climate based on shared socio-economic pathways scenarios. Moreover, we also incorporated climate and land-use risks based on climate anomalies and vegetation dynamics to assess future conservation strategies. The results revealed a tremendous range contraction in the wintering and breeding areas of the hachikuma species by 2050 and 2100. Our results suggest that the migration distance will likely increase under all scenarios. In addition, we found high-risk areas across hachikuma habitats while potential refugia areas were relatively small. Habitat restoration and the development of new protected areas are fundamental strategies for hachikuma conservation. Our approaches have provided comprehensive insights into broad biogeographic dynamics under multifaceted threats and on how we should tackle global changes through specific landscape management for long-distance migrants.

Key words: Climate change, conservation planning, ecological niche models, Crested Honey-Buzzard, Macrorefugia

# Raptor migration at Guantouling, south-west China: Phenology, weather influence and persecution pressure

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## Abstract

Southwest China, particularly between the Himalayas and the Beibu Gulf, constitutes an important corridor for migratory raptors along the East-Asian Continental Flyway. However, a lack of ornithological assessment and common practice of illegal hunting in this region emphasizes the need for research and conservation actions. To investigate the ecology of migration and scale of persecution, we launched one of the first citizen-science projects in mainland China to record southward-migrating raptors and hunting gunshots from 2015 to 2019 on Guantouling, a well-known raptor site in Southwest China. A total of 42,891 raptors were recorded, belonging to 30 diurnal raptor species. Grey-faced Buzzard *Butastur indicus*, Oriental Honey-Buzzard *Pernis ptilorhynchus* and Amur Falcon *Falco amurensis* were the three most abundant species recorded. The bulk of Grey-faced Buzzard and Amur Falcon migrated through Guantouling from mid-October till early November, while Oriental Honey-Buzzard migrated throughout October and early November. Precipitation slowed down migration significantly while increasing cloud cover was favoured by the three most abundant species. We found hunting mostly occurred in the afternoon, coinciding with an increasing number of Oriental Honey-Buzzard, which may become a major victim of hunting. Law-enforcement actions are thus suggested to prioritize peak raptor migration period, especially on cloudy days and after passage of cold fronts, when Oriental Honey-Buzzards and other species are likely to migrate. The annual counting scheme on Guantouling is not only an ecological survey, but also an effective way of public engagement to counter raptor persecution.

Key words: East-Asian continental flyway, raptor persecution, weather influence, phenology, Oriental Honey-Buzzard, *Pernis ptilorhynchus*

# Abundance of island avian predators in a heavily impacted tropical forest suggests that endemics face greatest risk from landscape changes

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## Abstract

Anthropogenic land cover change is among the largest threats to biodiversity, and island endemics and habitat specialists are especially vulnerable to these changes. We used road surveys and occupancy modelling to determine the distribution of birds of prey in the southern Philippine island of Mindanao and to assess the land cover characteristics that influence this distribution. During winter field surveys between 2014 and 2016, we observed 13 of the 27 birds of prey species present on Mindanao and we counted 1,656 individuals. Preliminary analyses suggest that the Brahminy Kite (*Haliastur indus*) and the Philippine Serpent-Eagle (*Spilornis holospilus*) were the most commonly observed species. Our models suggest that on average, detection probability was 86% for all raptors combined, 50% for Brahminy Kites, and 35% for Philippine Serpent-Eagles. Our models also predict that the probability of occupancy by Brahminy Kites (a purported habitat generalist with a large distribution) was positively correlated with forest disturbance while probability of occupancy by Philippine Serpent-Eagles (an endemic and purported forest specialist) was highest in near-pristine forests. Further, we observed fewer island endemics and more non-endemic residents than predicted by our models. These suggest that the anthropogenic changes in central and eastern Mindanao are more consequential to endemics than expected and that endemics are more vulnerable to these changes than are more widespread species.

# **The conflict of greens in offshore wind energy development from the perspective of raptor migration in East Asia**

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## **Abstract**

The East-Asian oceanic flyway is one specific raptor migration flyway in the world. Compared to other continental flyways, the East Asian oceanic flyway has a greater part of the migration route completed over the sea. A large number of migratory raptors fly through the ocean during spring and autumn migration every year. However, knowledge of how raptors fly across the sea along this specific flyway is still poorly known. To reach the goal of net-zero by 2050, most of the countries have been actively promoting energy transition, including the development of offshore wind farms. Taking advantage of potential wind resources in the Asia Pacific region, Asia is set to become a leader in offshore wind markets. Some offshore wind farms are already in operation in East Asia, while more are being constructed and planned. Unfortunately, due to the lack of data, the impact of emerging offshore wind farms on raptors migrating through East Asian oceanic flyway is difficult to evaluate. Regional networks of raptor-watch have been established in many countries of East Asia. However, migrating raptors know no political boundaries. Closer international cooperation is needed to link information on both sides of the ocean. Furthermore, the studies of high-tech tracking methods, such as satellite tracking or radar, on species that prefer cross-sea migration can also improve our knowledge on the flight behaviour of raptor migration over the sea. Under the expected large-scale offshore development, we need to work together to develop appropriate conservation strategies for the potential impacts of intense offshore wind farms on raptor migration in East Asia.

Key words: East Asian oceanic flyway, offshore wind farm, raptor migration

# Richness and abundance of raptors in response to wind farms in Central Karnataka, India

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## Abstract

Wind energy has been considered as a green energy source because it is less harmful to the environment compared to the conventional modes of power generation. However, their impact on wildlife is a growing concern, especially for birds and bats. Wind farms are known to affect both birds and bats through collision with rotating blades and displacement of birds from turbine sites due to the physical structures of the turbines. The impacts of wind turbines on wildlife especially on birds are limited in India. In this context, we studied the impact of wind turbines on raptor species richness and abundance at Chitradurga and Gadag districts in Karnataka. To monitor raptors, we identified a total of six sites (three each around the turbine and the control sites). At each site, we established a vantage point count station to monitor raptors. We made observations from 09:00 hr - 15:00 hr twice a month in 2016 - 2017. We recorded a total of 16 raptor species from the study area. The most abundant species at the turbine sites were the Common Kestrel and Shikra, whereas Bonelli's Eagle and Short-toed Snake-Eagle were in the control site. The mean abundance (0.52/site) and species richness (14) were higher at the control site as compared to the turbine site (0.40/site, 12). The total height of the turbine from the ground to the topmost points of rotating blades is about 140-150 m. The length of rotating blades is about ~50 m. If a bird's soaring height is within the 50 m distance from the turbine location, it was considered as a risk zone, while the distance of >50 m was treated as a safe zone. Although we did not encounter any direct collision of raptors with rotating blades, the Common Kestrel, Short-toed Snake-Eagle, and Shikra were more vulnerable to collision as these species were observed to soar close to rotating blades. We observed a significant difference in raptor abundance between the sites (N=114, P=0.02). The mean raptor abundance was higher in safe zones (0.21/site) compared to the risk zone (0.15/site) in turbine sites. Wind turbines in these districts are relatively older and hence the raptors are avoiding or soaring above turbine locations.

# Updated range metrics and a global population estimate for the critically endangered Philippine Eagle using a spatial ensemble habitat model

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## Abstract

Many range-restricted taxa are currently experiencing severe population declines yet lack fundamental biological information regarding distribution and population size. Establishing baseline estimates for both these key biological parameters is however critical for directing long-term monitoring and conservation planning for at-risk endemic species. The International Union for the Conservation of Nature (IUCN) Red List uses three spatial range metrics that define species distributions and inform extinction risk assessments: extent of occurrence (EOO), area of occupancy (AOO) and area of habitat (AOH). However, calculating all three metrics using standard IUCN approaches relies on a geographically representative sample of locations, which for rare endemic species is often spatially biased. Here, we use model-based interpolation with an ensemble Habitat Suitability Model, correlating occurrences with remote-sensing derived environmental covariates, to calculate IUCN range metrics and a global population estimate for the critically endangered Philippine Eagle (*Pithecophaga jefferyi*). Our ensemble-averaged habitat model had high predictive accuracy and was able to identify key areas of Philippine Eagle habitat across the species global range. We estimated an AOH = 49,426 km<sup>2</sup> and from this metric calculated a maximum EOO = 609,697 km<sup>2</sup> and a minimum EOO = 273,794 km<sup>2</sup>, with an AOO = 54,695 occupied cells. Based on inferred habitat from the AOH metric and territorial habitat area from home range estimates, we provide an updated global population estimate of 677 breeding pairs (range: 549-772 pairs), or 1354 mature individuals, across the entire Philippine Eagle range. We demonstrate that even when occurrence sampling is geographically biased, robust habitat models can be built which enable quantification of IUCN range metrics and a baseline population size estimate. In the absence of adequate location data for many rare and threatened taxa, our method is a promising spatial modelling tool with widespread applications, in particular for island endemics facing high extinction risk.

Key words: Area of habitat, area of occupancy, extent of occurrence, Habitat Suitability Models, population size, range metrics



# **The Northwesterniana Flyway, Luzon, Philippines: A five-year raptor monitoring research in a changing environment and extreme climatic conditions**

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## **Abstract**

The Philippines is part of the Oceanic Flyways of the world where the northern hemisphere avifaunal species travels to the south during the winter, then goes back in the spring in time for breeding. The Northwestern Luzon, in proximity to Taiwan plays a conduit to migrating birds that enters the Philippine archipelago. It is a major raptor flyway aside from the Central Cordilleras and the Sierra Madre in the East of Luzon. The Northwestern University Biological Diversity Research Unit together with the Raptor Watch Network Philippines collaborated in a five-year full spring season monitoring (March to May) with a research grant from the Asian Raptor Research & Conservation Network (ARRCN). Stationed in Pancian and Pasaleng in the Municipality of Pagudpud Ilocos Norte and other satellite monitoring areas to validate the different migration routes within the NW Luzon. A map is therefore updated annually based on actual field observation. The five-year monitoring research from 2015-2019 also produced a species list of 13 genera and 21 species and their subspecies. Photographs were also taken to validate species identification. The team has also engaged in long-term ecological and biodiversity research in the past 15 years and in synchrony with raptor monitoring. It commenced in 2007 assessing forest fragments in protected areas in the entire NW Luzon including five national parks of the region. To date, the changing vegetation as a result of frequent super typhoons, infrastructure development, and human exploitation impedes the conservation initiatives of the University, NGOs, and government agency (Department of Environment & Natural Resources – DENR Region 1). The status of these forest fragments as raptor stopovers and transients are becoming vulnerable and their coexisting wildlife are in peril. Local and migrating raptors would find constricting feeding grounds as they fly into their wintering grounds. Subsequently, the team analysed the floristic composition of the different protected areas along the major flyways in the NW Luzon, to understand the health of its ecosystem identify threats and possible cause of degradation. This research also illuminates the changes in the landscape and their capacity to harbour our migrating raptors.

Key words: Raptors, northwest Luzon, Ilocos, conservation, changing vegetation landscape

# Java's owl trading in the pandemic era

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## Abstract

In 2017, research by Vincent Nijman, an anthropologist of Oxford Brookes University, showed that in the last 10 years, there was a tremendous increase in the owl trade in Indonesia. Surveys in the bird markets of Java found 13,000 owls were displayed in the markets. From my surveys in 2018-2019, I found about 100 owls being displayed in the markets. The owl trading in Java has shifted from offline to online trading. Online trading has become the first choice because it is safer, where the trader or seller could hide their identities and they are mostly connected with the trade of the protected Javan Scops-Owl or *Celepuk Jawa*. From the monitoring of the online owl trade, it is estimated that one owl is sold each day in one community group of owl trading. There are three active community groups of owl trading and in 2018, 795 owls were sold. This situation has not improved in 2019 however, with the initiation of #owlforall in the social media campaign and offline campaigns, the owl trading in Java has reduced. This campaign supports the Ministry of Forestry and Environment and *Balai Konservasi Sumber Daya Alam* (BKSDA). In early 2020, although the owl trading was affected during the COVID-19 pandemic in Indonesia, the owl trade in Java still exists with a tendency to increase towards the end of 2020, mostly for the trade of the unprotected Javan Barn Owl or *Serak Jawa*. This paper will present the results on the monitoring of Java's owl trade in 2021, why Javanese are still engaged with owl trade in the pandemic era and the impact of the campaigns so far.

# **ABSTRACTS**

## **Concurrent Session 3**

# Community engagement on Flores Hawk-Eagle (*Nisaetus floris*) conservation action in Ende, Flores, Indonesia

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## Abstract

Flores Hawk-Eagle (*Nisaetus floris*) is the only critically endangered raptor endemic to the Lesser Sundas. Since its declaration as a separate species in 2004, conservation effort for this species has been very limited. An active nest was found in 2014 at Wolojita Village, Ende District, Flores. The nest was located at Otoseso Forest, a private customary land, buffer area of Kelimutu National Park. Considering that the area is a primary habitat for the Flores Hawk-Eagle, in 2019 the community members formed a legal organization named “Jatabara” to protect and conserve the species. To support Jatabara’s conservation activity, in 2021 several programmes have been implemented using several approaches. The first was an ecological approach, where we trained Jatabara members to record and monitor the breeding cycle of the species. Through this method, members have protected the nest on a regular basis. Fortunately, one chick has successfully hatched and developed into a juvenile individual that hunts independently. The second approach we used was through education. A full-colour and illustrated activity book was made as a tool in conservation education aimed at the local elementary school. This method has raised public awareness since a young age. The third approach is cultural. In Flores Island, the weaving activity has become part of the culture passed down for generations. We incorporated the conservation value into the ‘ikat’ weaving. We asked the weaving artists to make a novel pattern of the Flores Hawk-Eagle into the woven scarf, and helped them market the product. This activity also contributes positively to the local income. We believe that the conservation of Flores Hawk-Eagle can succeed if the community gets direct benefits from the existence of the species. The local community plays an essential role in the conservation of Flores Hawk-Eagle as they coexist with the species and share the same resources. Therefore, community involvement in conservation is the key to reaching the ultimate goal.

Key words: Community, conservation, Flores Hawk-Eagle, Flores

# Sustainable palm oil and Barn Owls in Malaysia

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## Abstract

The high yield, versatility, and relatively low cost of palm oil has led to its wide use in the world today; with Indonesia and Malaysia being the world's leading palm oil producing countries. There are various ways of defining palm oil sustainability; broadly there are economic, social and environmental aspects. In the environmental context, we wish to highlight sustainable rodenticide use and Integrated Pest Management (IPM) in oil palm plantations. One of the major vertebrate pests in oil palm plantations are rats, and the use of Barn Owls as a biological control agent against rats is frequently featured in IPM. In most plantations, encouraging Barn Owls is typically implemented alongside complementary baiting. Both first- and second-generation rodenticides pose a threat to non-target species and there has been a wide array of non-target poisoning reported in birds (raptor and non-raptor) and mammals. Pesticide use is covered in both RSPO and MSPO criteria, but stricter guidelines need to be in place when Barn Owl programmes are implemented with fixed annual baiting. As palm oil companies typically include data on local Barn Owl populations to fulfil the criteria of sustainable practices, sustainable certification bodies should introduce stricter guidelines on rodenticide use in relation to local Barn Owl populations. Two main ways pesticide use can be reduced is by having plantations apply rodenticide only when the rat population is above the threshold level of <5% damage to crops, and by replacing annual fixed baiting campaigns with the census-and-bait method.

Key words: Palm oil, IPM, rats, Barn Owl, rodenticide, sustainable use

# Short-term results of a Barn Owl translocation programme from Peninsular Malaysia to Sabah, Borneo

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## Abstract

There have been no previous records of a native Barn Owl population in Borneo, and several translocation programs have been carried out to introduce Barn Owls as a biological control agent against rat pests in oil palm plantations. In 2014 and 2015, Southeast Asian Barn Owls, *Tyto javanica javanica*, were translocated from Pahang, Peninsular Malaysia, to Lahad Datu, Sabah, Malaysia. Nest-boxes were monitored to assess the status of the introduced Barn Owls. Barn Owls preferred wooden nest-boxes over fiberglass boxes. From 2014 to 2018, the average nest-box occupancy rate throughout the entire study period was 66.7%, and 102 breeding attempts were recorded. Breeding was recorded throughout the year, with no obvious breeding cycles such as that of Barn Owls in Peninsular Malaysia. Throughout the study period, 61% of laid eggs hatched and 60% of laid eggs produced young that successfully fledged. Pellets were also collected from nest-boxes and from under identified roost sites. Analysis of pellets showed that the diet of the Barn Owls consisted of only small mammals; 77% of identified prey were *Rattus rattus diardii*, the main rat pest species, followed by other rodents (22%) and shrews (1%). Damages by rats on the oil palms were also assessed and comparisons were made on damage at areas with only Barn Owl as rat control (T1), areas where rodenticides were applied once a year (T2) and areas where rodenticides were applied twice a year (T3). Damage was lowest at T3 compared to the other two treatment areas throughout the entire study period, probably due to the intensive baiting carried out. Damage at T1 was comparable to damage at T2 (with the exception of the first year of study). Additionally, damage at T1 after the first year was frequently below the 5% damage threshold level. The results of this study indicate that introduced Barn Owls are able to establish successfully and breed, and the owls were sufficient to control rat pests for at least three years and perhaps more.

Key words: Barn Owls, translocation, breeding, diet, rat control

# Barn Owl island: A model of Barn Owl reintroduction to a small area of palm oil plantation

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## Abstract

Barn Owl (*Tyto alba*) provides important ecosystem services in the agricultural landscape by serving as a biological control. In oil palm plantations across southern Thailand, rodent infestation greatly affects crop yield and productivity. Eighteen-year breeding programme of Barn Owl and artificial nest box (ANB) installation are among the integrated management strategies that help farmers alleviate crop damage while reducing chemical runoff in the agroecosystem. In this study, nesting success and ANB occupancy by Barn Owl were monitored. In 2014, one pair of two-month old Barn Owls were reintroduced to a four-acre oil palm plantation where ANB was installed. Post-release methods included short term rearing in a nest box for a week and food supplementation with dead rodents. In the first breeding season, the reintroduced pair returned to use the box as their nesting sites. This pair successfully bred and had a 100% rate of owlets (three chicks) hatched in ANB. In the subsequent year during the next breeding season, two ANBs were occupied by the same pair and an additional pair which was potentially offspring of the founder. Between 2016 and 2021, Barn Owls occupied 67% - 71% of the ANBs, most of which were placed in close proximity. Currently, eight ANBs are occupied, and the installation is also expanded to primary school areas. This long-term breeding program highlights the success of Barn Owl reintroduction and breeding programme in the relatively small plantation as a Barn Owl island for breeding during breeding season. The Barn Owl-based pest management could be applied to a larger area and serve as a model to promote Barn Owl viability in the agricultural landscape.

Key word: Barn Owl, *Tyto alba*, small palm oil plantation, artificial nest box, reintroduction

# Historical-biographical study on Grey-faced Buzzard (*Butastur indicus*) from the perspectives of the old folks in Sanchez Mira, Cagayan, Philippines

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## Abstract

Grey-faced Buzzard (*Butastur indicus*), locally known as *Sawi*, is a migratory raptor that pauses for stopover in the country during its trans-equatorial flight across the Pacific. Recent reports showed a gradual decline in the number of the bird species as it transverse the Philippine archipelago especially in the northern part of Luzon. In this study, the researchers took into account the biographical information of the birds and its historical significance to the people. The study employed the Historical-biographical research design and selected respondents for interview through purposive sampling technique. Interview protocol was the main tool in gathering the needed data. The study covered the barangays frequented by the Grey-faced Buzzard in the municipality of Sanchez Mira. In particular, these are barangay Callungan, Pukel, Santiago, Marzan, and Dacal, Cagayan, Philippines. There were 80 informants included in the data collection process. Mean and percentage were applied in dealing with the statistical computation of data gathered. Results showed that the old folks from Sanchez Mira, Cagayan, Philippines know significant biographical and historical information about the Grey-faced Buzzard and the most common is that there was no distinct difference in the colour of a male and female Grey-faced Buzzard. The Grey-faced Buzzards usually inhabit the dense forest areas in the municipality consuming insects living on trees as their main diet. It was commonly observed by the old folks that these raptors usually arrived in Sanchez Mira, Cagayan, Philippines during the months of March and April, and this has been consistent every year hence making Sanchez Mira as one of their frequent stopover sites during their migration periods. Different contributions of the birds such as its role in pest control management and its potential to attract tourists were highlighted. A gradual decline in the cases of hunting were observed by the interviewees. The locale of the study makes it unique since historical-biographical information of Grey-faced Buzzard in this area is under studied.

Key words: Grey-faced Buzzard, historical, biographical, conservation, Philippines



# **A five-year comparative study of raptor migration count at Cape San Agustin, the Philippines (2016-2020)**

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## **Abstract**

The monitoring of raptor migration during spring and autumn migration season in Cape San Agustin, Lavigan, Governor Generoso, Davao Oriental, the Philippines started in 2016. A daily count was conducted every September 15th until October 30th. The count started at 0500H and ended by 1600H. Data showed that the highest count was in 2020 with 38,414 raptors. This was followed by 2019 with 34,787 and 2018 with 30,671. In 2017 the count was only 19,566, and the lowest count was in 2016 with 10,355. Data showed that the count of migrating raptors increased every year. Moreover, the number of migrating raptors passing through the site varies as the data were divided into the first fifteen (September 16-30), the second fifteen (October 1-15), and the last fifteen (October 16-30) days. The weather had a significant impact on the arrival of migrating raptors at the site, which was located on the southernmost tip of the Philippines.

# **The role of monitoring, rescue and rehabilitation of *Gyps* vultures in reducing the rate of mortality in Raigad, India**

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## **Abstract**

The critically endangered *Gyps* vulture conservation programme has been conducted since 2000 by the Society of Eco-Endangered Species Conservation and Protection (SEESCAP Mahad), an NGO working at Mahad, Mangaon, Pali, Mhasala, Shrivardhan Tehsil in the district Raigad. Out of nine species found in the Indian subcontinent, 4 species, i.e. the Oriental White-rumped Vulture (*Gyps bengalensis*), Long-billed Vulture (*Gyps indicus*), Slender-billed Vulture (*Gyps tenuirostris*) and Red-headed Vulture (*Sarcogyps calvus*), are declared as critically endangered species. This paper presents an overview of two species - Oriental White-rumped Vulture and Long-billed Vulture that are residents in the district Raigad (Western Ghat of state Maharashtra). Since 2000, attempts have been dedicated towards protecting the various breeding colonies in the eight pocket areas by ensuring safe food, protecting habitat from threats, strictly monitoring the breeding activities and rescue operations of fallen nestlings or injured individuals. The conservation programme has been conducted by in situ breeding methodology. Other vulture conservation activities done elsewhere in the country have made very limited attempts to rescue and rehabilitate injured individuals for release back into the wild habitat. From 2006 to 2018, through collaborative programmes with the state forestry department, SEESCAP Mahad has rescued 19 vultures, including wintering Himalayan Griffon vulture and the Eurasian Griffon vulture. However, from 2019, climate impacts from the Nisarga Cyclone, Tauktae Cyclone and heavy cloudburst rainfall caused vast destruction of coastal breeding colonies. In 2021 so far, 9 juveniles have been rescued. Recent survey census done in March 2021 by SEESCAP and the state forestry department has found a substantial decrease in the vulture population in the district Raigad. From 347 counts in 2019, the population of Long-billed vulture and white backed vulture has dropped to 249. With the help of Shrivardhan Tehsil forestry department, SEESCAP has launched a vulture rescue centre. The study shows that strictly monitoring breeding activities, checking the fallen nestlings, and rescue and rehabilitation efforts are the essential key roles in conservation of these critically endangered *Gyps* vultures. Since the past 12 to 13 years, it is thought that along with major threats of habitat destruction, insufficient food, starvation, mining and farming close to breeding sites, jungle fires, etc., climate change impacts on vultures are noticeably higher. This paper focuses on establishing that monitoring and dedicated attempts in rescuing and rehabilitation of injured individuals that are to be released in the wild are valid components in reducing the rate of mortality in *Gyps* vultures in Raigad.

Key words: Oriental White-backed Vulture, Long-billed Vulture, monitoring, rescue, rehabilitation release programme, reducing mortality

# **ABSTRACTS**

## **Concurrent Session 4**

# Peregrine Falcon survival rates derived from a long-term study at a migratory and overwintering area in Coastal Washington, USA

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## Abstract

After a well-documented recovery following substantial population declines throughout most of North America, the Peregrine Falcon (*Falco peregrinus*) was delisted under provisions of the Endangered Species Act in 1999. Post-delisting monitoring for the Peregrine Falcon involved surveys of breeding locations and did not specifically emphasize other metrics of population performances such as estimates of survival. We used banding data from Peregrine Falcons captured on the Washington coast during 1,212 vehicle surveys between 1995 and 2018 to assess apparent survival and resighting frequencies. Our mark-recapture data set included 226 Peregrine Falcons, 148 females and 78 males. A total of 14 Peregrine Falcons were recovered dead and another eight were found injured or uninjured and unable to fly due to illness or substantially soiled feathers. We had 744 resightings, 67.1% ( $n = 499$ ) by our research group during surveys (Group A) and 32.9% ( $n = 245$ ) by others (Group B). We found a dramatic increase in Group B contributions beginning in 2008 due to the emergence of digital camera use in wildlife photography and increased public awareness of our project. Between 1995 and 2018 we collected data that supported the estimation of apparent survival for three age classes: 0.4238 (SE = 0.0568) for hatch-year (< 1 yr old); 0.6634 (SE = 0.0663) for second-year (1 yr old), and 0.7382 (SE = 0.0295) for after-second-year (> 2 yr old). These longer-term data represented a more complete understanding of apparent survival in this population in comparison to data we previously reported from the period 1995 to 2003: an annual apparent survival estimate of 0.597 (SE = 0.054), which included no difference by age class. Our long-term mark-resighting analyses of overwintering and migratory Peregrine Falcons along the Washington coast provide evidence of a reasonably high level of apparent survival that suggests good population performance.

Key words: Peregrine Falcon, *Falco peregrinus*, apparent survival, banding, mark-recapture model, resighting probability, survival

# Assessing the diet of the Black-thighed Falconet (*Microhierax fringillarius*) in Peninsular Malaysia

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## Abstract

Assessing predator-prey relationships are important for our understanding of the ecology of many vertebrates. We examined diets of the Black-thighed Falconet (*Microhierax fringillarius*), using a non-invasive method by collecting faecal samples from their roosting area. All arthropod fragments were identified under a stereo microscope. All samples were collected from Ipoh, northwest Peninsular Malaysia, between February and September 2017. The samples were composed of three major components, namely, exoskeletons (53%), wings (27%), and unidentifiable elements (20%). The head, elytra, body segment, legs, and wings were the most often discovered insect body parts. Six orders of prey items identified belong to the following arthropod taxa: Coleoptera (30.43%), Araneae (21.74%), Blattodea (17.39%), Orthoptera (13.04%), Hymenoptera (13.04%), and Mantodea (4.35%). The length and width measurements of the faecal pellet were  $15.55 \pm 6.02$  mm (mean  $\pm$  standard deviation) and  $7.87 \pm 2.74$  mm, respectively, with dry weight ranging from 0.01 g and 0.32 g ( $0.16 \pm 0.06$  g). This non-invasive technique enables an understanding of how energy moves across ecosystems. However, comprehensive dietary studies and additional methods such as molecular techniques are needed to increase the proportion of prey identified.

# Reviewing the current distribution of Javan Hawk-Eagle (*Nisaetus bartelsi*): A case study involving citizen science data from Burungnesia database

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## Abstract

As the national bird of Indonesia and being threatened by habitat loss and illegal wildlife trade, Javan Hawk-Eagle (*Nisaetus bartelsi*) has been the major concern for conservation efforts. Numerous studies involving this species have been conducted to address their life history, genetic and ecological aspects including their spatial distribution across Java through Ecological Niche Modelling (ENM). A comprehensive study at a broad geographical extent such as Java has only been conducted once using datasets compiled from terrestrial survey data and data mined from biodiversity databases. However, the occurrence data mined from such databases are problematic, as the data are rarely updated; hence the validity of those datasets are implausible. Moreover, with the advent in citizen science for avifaunal database, more occurrence data are acquired in real time and revealed new locations including Bali. Thus, the current distribution of Javan Hawk-Eagle needs to be reassessed. In that sense, citizen science movement driven by Burungnesia (observation application only for Indonesian birds) addresses the gap in avifaunal distribution data coverage which is unlikely to be covered by conventional scientific methodology. Since it was released in mid-2016, Burungnesia has more than 2,000 contributors, producing 194,987 data rows and 31,109 checklists. By early November 2021, Burungnesia has already recorded 1,213 species of birds; of which 81 are birds of prey including the Javan Hawk-Eagle. So far, Burungnesia recorded 241 occurrence points for the Javan Hawk-Eagle with approximately 338 individuals counted. With that, Burungnesia provides better data coverage for reassessment of Javan Hawk-Eagle's distribution. Therefore, this ongoing study aims to review the current distribution of the Javan Hawk-Eagle by conducting a case study involving citizen science data derived from Burungnesia database. In doing so, we are currently constructing an Ecological Niche Model (ENM) using Generalized Linear Model (GLM) to describe the breadth and extent of their distribution as interpreted from conditions inherent to the current distribution.

Key words: Distribution review, citizen science, Burungnesia, Javan Hawk-Eagle, *Nisaetus bartelsi*

# Habitat suitability modelling of Sunda Scops-Owl (*Otus lempiji* Horsfield 1821) using Geographic Information System in Java Island based on Burungnesia citizen science data

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## Abstract

Sunda Scops-Owl (*Otus lempiji* Horsfield, 1821) is a cosmopolitan species with global distribution in the Greater Sundas and is commonly found in urban areas. However, studies on this species mainly focused on forested areas, leaving questions regarding their distribution in urban landscapes. Therefore, a comprehensive study was conducted on their habitat requirements in urban areas particularly in densely populated regions such as Java. To do so, we aim to construct a habitat suitability model of the Sunda Scops-Owl in Java using Geographic Information System (GIS). We based our research on citizen science datasets that were derived from the Burungnesia application. We derived occurrence data which were obtained circa 2016–2021. The environmental variables that were used included bioclimatic variables, elevation, vegetation, human population, wetlands and water bodies. We used Maximum Entropy (MaxEnt) on MaxEnt software. The model suggested that human population affected Sunda Scops-Owl distribution in Java Island and this result proved that this species has a tendency to be near urban areas with a 40 percent contribution compared to the other variables. The habitat suitability model was robust with an AUC (Area Under Curve) value up to 0.856. The most important environmental variables are human population, elevation, and vegetation.

Key words: Burungnesia, citizen science, habitat suitability, MaxEnt, Sunda Scops-Owl

# The winter ecology of Pallid Harrier *Circus macrourus* in northwestern India

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## Abstract

The Pallid Harrier (*Circus macrourus*) is listed as a globally near threatened species in the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. These are widespread winter migrants to India inhabiting mainly dry habitats with occasional sightings in wetlands. India forms one of the strongholds for the species in the world but scanty information is available on their winter ecology. Such information is urgently required to maintain their populations at breeding grounds. From 2008 to 2015, information on their winter ecology especially population structure, food and foraging movements were collected by monitoring their communal roosts located in the arid and semi-arid environments in northwest India especially focusing on two large states i.e. Gujarat and Rajasthan. Satellite telemetry study provided information on their migratory routes and foraging movements. Major survival threats are highlighted and recommendations for their conservation are provided.

Key words: Pallid Harrier, winter ecology, migrant, communal roost, satellite telemetry, India



# Habitat projections for conservation using Species Distribution Models: A case of globally threatened Egyptian Vulture in northern India

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## Abstract

Egyptian Vulture is a globally threatened raptor native to Europe, Africa and Asia. It is a resident in India, and Uttar Pradesh, a northern state, has abundant population spread throughout the state. However, its distribution and habitat have not been sufficiently studied. This study aims at finding its potential habitats using species distribution modelling. Eight successful models (ANN, CTA, GBM, GLM, MARS, MaxEnt, RF and SVM) were developed which differed significantly in expanse of suitability area and model performance parameters. There is a view that none of the models can be considered as the best, therefore, to overcome this problem ensemble modelling is recommended due to better accuracy by virtue of extracting advantages from all the component models. Hence, an ensemble of these models was also developed. As per the performance indicators, like AUC, TSS and Kappa values, ANN, CTA and GBM were found to be inferior models while MARS, GLM, MaxEnt, RF and SVM were superior models. When incorporating ground verification, MARS was placed in the inferior model category and ensemble was found to be the best overall. Vital variables for habitat determination across the models as well as their percentage contributions varied significantly. We hypothesised that for Egyptian vulture, ensemble modelling can predict best area suitability in a landscape with different ecozones with agriculture practices. The five most important habitat determining variables as per the ensemble model were NDVI for the month of January, bio09 (Mean temperature of the driest quarter), bio08 (Mean temperature of the wettest quarter), LULC and bio15 (precipitation seasonality). Semi-arid ecozone showed the highest amount of suitable area followed by Tarai, Vindhyan-Bundelkhand and Gangetic plains with varied vegetation composition and climatic conditions. Overall, semi-arid ecozone with low rainfall, higher temperature, ravine vegetation and prominent agriculture could be considered the most favourable habitat since all the three categories of suitable area were present in this region. Egyptian Vulture was found also to inhabit riverbanks and areas near human settlements such as garbage dumps and electricity poles for feeding and roosting. Ensemble modelling predicted 59.7% (unsuitable), 28.8% (low), 10.9% (moderate) and 0.6% (high) suitable area out of 240928 km<sup>2</sup>. Different categories of area suitability can be used for vulture conservation by adopting different strategies such as agroforestry and practicing animal husbandry for providing sufficient nesting/roosting sites and foraging materials.

Key words: Habitat suitability, conservation strategy, vital parameters, *Neophron percnopterus*

# Population levels and productivity of the critically endangered White-rumped Vulture (*Gyps bengalensis*) are stable in Arghakhanchi District, Nepal

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## Abstract

The White-rumped Vulture *Gyps bengalensis* is an accipitrid vulture native to Asia. Formerly described as the most abundant large bird of prey in the world, this species suffered dramatic population declines during the 1990s across its range. As a result, it is listed as critically endangered on the IUCN Red List. It has suffered an extremely rapid population decline primarily as a result of feeding on carcasses of animals treated with the veterinary drug diclofenac, which is nephrotoxic to *Gyps* vultures. In Nepal, its population declined by 91% between 2002 and 2011. Several conservation activities initiated since 2006 which includes the banning of diclofenac on veterinary use, promotion of safe alternative meloxicam, advocacy, education, monitoring, research, captive breeding, supplementary feeding and site protection. Thus, the results of long-term monitoring of White-rumped Vulture populations in Nepal indicated that a rapid decline from 2002 up to about 2013 gave way to a partial recovery between 2013 and 2018. We monitored one of the isolated breeding colonies of White-rumped Vultures within the Arghakhanchi district of western mid hill of Nepal from 2010 to 2021. We visited the colony at least three times during November, February, and May each breeding season and calculated nesting success. We followed oft-used methodology to estimate trends in yearly values of the number of occupied nests, fledglings, and productivity (i.e. young fledged per occupied nest). The number of occupied nests, the number of fledglings, and productivity were analysed separately using identical models. Although the number of occupied nests appeared to increase, the credible interval of the growth rate ( $r$ ) overlapped zero ( $r = 0.05$ , 95% CRI =  $-0.06 - 0.16$ ). The number of fledglings ( $r = 0.04$ , 95% CRI =  $-0.04 - 0.16$ ) and productivity ( $r < 0.01$ , 95% CRI =  $-0.08 - 0.09$ ) appeared stable. Our result is encouraging because it shows stable population and productivity levels in a breeding colony of this critically endangered species. However, we only surveyed a small portion of the global population over a relatively short time period. We recommend expanded and coordinated population monitoring for this species across its range.

Key words: Diclofenac, occupied nests, population, productivity

# **ABSTRACTS**

## **Concurrent Session 5**

# Five-year monitoring of migratory raptors during autumn season in Glan, Sarangani Province, Philippines

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## Abstract

The Philippines is part of the East Asian-Australasian Flyway and is considered as an important bird and biodiversity area (IBA). The latter designation puts the country as among the top priority sites for conservation and protection of birds and other wildlife. Majority of raptor studies in the country is focused on resident raptors particularly the Philippine Eagle (*Pithecophaga jefferyi*) while studies documenting population and species diversity of other migratory raptors is limited. We herein fill this gap by reporting the results of a five-year study on migratory raptors passing by Glan, Sarangani Province, located in the southern tip of mainland Mindanao. Migratory raptor monitoring was conducted daily for forty-five days from the month of September to October from 7:00 A.M. until 3:00 P.M. Population and species were determined through scanning techniques and estimation methods. Field guides were used to identify the species of raptors based on distinct bird features such as wing shape, colour, size, etc. This study confirmed that Glan is among the major migration routes of at least 8 species of migratory raptors, the most abundant of which are the Chinese Sparrowhawk (*Accipiter soloensis*; 96%) followed by Grey-faced Buzzard (*Butastur indicus*, 3.9%). The results were used by the local government unit in formulating conservation initiatives for the conservation and protection of these raptors and their roosting sites. Also, this study can be used to increase the awareness of the local community on the importance of these birds in the ecosystem.

Key words: Raptors, migratory raptors, Sarangani Province, Chinese Sparrowhawk, Grey-faced Buzzard

# Dynamics of raptor migration in Cape San Agustin, Davao Oriental, Philippines

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## Abstract

Raptor migration is an important evolutionary movement as a direct response to shifting kinds and amounts of light, temperature, and food availability. The Philippines is being considered as an important location both as wintering ground and as a significant East Asian Australasian flyway when raptors migrate to Indonesia. Despite this phenomenon, very little attention on research and monitoring was done in the country. Cape San Agustin for instance, which lies at the tip of Mount Hamiguitan Range peninsula in Davao Oriental Mindanao, is a recently discovered monitoring site for more than 30,000 migratory raptors. Since 2018 and despite the COVID-19 pandemic, this site was consistently monitored from mid-September to October to document the number and species of migratory raptors, document the temporal distribution and flight pattern of raptors, and determine their movement pattern as they travel the mountain ranges of Mount Hamiguitan. Four raptor species were monitored namely *Accipiter soloensis*, *Butastur indicus*, *Pandion haliaetus*, and *A. gularis*. *Accipiter soloensis* (>90%) comprised most of the migratory raptors observed. *Butastur indicus* comes second with <8% while very few *P. haliaetus* and *A. gularis* were documented. Except for 2018, the peak of migration occurred in the last two weeks of October, >70% of the total arrival. Most migratory raptors were morning flyers (80%) from 0600H to 1200H. Early morning before 0800H, the raptors were usually flying low, riding wind updrafts. But the majority of them travel using thermals, especially around 0800 to 1200H. With strong thermals, raptors were too high and hard to detect at the monitoring area. Initial observations also indicate that raptors travel on Mount Hamiguitan Range along the eastern side facing the Pacific Ocean. Nonetheless, this observation needs further validation to also include if they just fly above the mountain ranges or fly low along ridges to forage. This information is critical to attest and substantiate the role of the UNESCO World Heritage Site, Mount Hamiguitan, for the transboundary migration of raptors. Research and monitoring will continue to understand the ecology of migrators in Mount Hamiguitan Range in spite of funding difficulties.

Key words: Raptors, East Asian Australasian flyway, *Accipiter soloensis*, Cape San Agustin, Mount Hamiguitan Range

# Migration ecology of Chinese Sparrowhawks in the East Asian-Australasian Flyway

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## Abstract

As one of the most abundant migratory raptors in the East Asian-Australasian Flyway, the Chinese Sparrowhawk (*Accipiter soloensis*) has drawn the attention of raptor biologists. However, not much information regarding migration routes and ecology was available. At Kenting National Park in Taiwan, we deployed satellite transmitters on 13 individuals (12 Microwave 5g PTT and 1 Biotrack 6g Pinpoint Argos Solar-S) from 2016-2018. In 2019, we deployed another 13 transmitters (4 Microwave, 2 Biotrack, and 8 Druid 6g Debut II) in Korea to understand their migration route in the oceanic flyway. Out of the 13 individuals released from Taiwan, 6 wintered in central and south of the Philippines and 4 in Indonesia. The northbound migration started in late March, and 6 individuals completed the northbound journey to breeding sites in central and northern China. Results showed that the longitudinal span of the northbound and southbound journeys were similar in central to south of the Philippines (5.5 - 12.5 degree N). However, the longitudinal span of the northbound (8 degree) journey was twice the southbound from north of the Philippines to northern Taiwan (18.5 - 25.5 degree N), indicating that biogeography and weather might play a role in differences of seasonal route selection. Only a few individuals from Korea provided high enough resolution for the identification of the detailed route, and data from those limited fixes indicated that at least some individuals took the direct oceanic route from Korea to Okinawa, and then to the Philippines, which is unknown to the scientists. Out of the 13 individuals, 3 and 4 wintered in the Philippines and Indonesia, respectively. Three individuals returned from the Philippines to southeastern China, and two of them crossed the Yellow Sea back to the breeding site. It demonstrated a long hypothesized loop-migration route north of the Philippines. Future studies should focus on the migration patterns among regions and flyways, and their relationships with meteorological conditions.

Key words: Chinese Sparrowhawk, satellite tracking, migration ecology, East-Asian Oceanic Flyway

# Different migration routes of Black Kite *Milvus migrans* subspecies in Thailand

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## Abstract

The Black Kite *Milvus migrans* is a medium-sized diurnal raptor in Thailand. There are two taxa, i.e., *M. m. govinda* and *M. m. lineatus*. The former is currently classified as a sedentary breeder, and the latter, alternatively called the Black-eared Kite, is a boreal winter visitor, spending their non-breeding months between September and April in Thailand. Five Black Kites, four of *M. m. govinda* and one of *M. m. lineatus*, were tracked using GPS-GSM loggers (Druid Technology Co., Ltd.). All kites resided in Pakpli paddies, Nakhon Nayok, central Thailand, at where the site harbors the largest night roosting of 2,000 *M. m. lineatus* kites. For *M. m. govinda*, two juveniles and two adult males were tracked. Juvenile kites were tagged when they were nestling in nests in April 2020 (one bird), whereas the two brooding adult males were trapped using Do-Ghaza method at their nesting areas. One *M. m. lineatus* was an adult female and wild caught at its night roosting site in January 2021. All tagged *M. m. govinda* migrated from the breeding area in May to spend the monsoon months between June and October in India, travelling through Myanmar and Bangladesh. Two juvenile *M. m. govinda* lived in NW India, and the adult males in Eastern India. The kites showed a distinct migratory pattern of east-west direction, i.e., longitudinal migration, as opposed to many north-south boreal raptorial species in the country. One juvenile, designated as R96 and tagged in April 2020 when it was a nestling, completed its loop migration between Thailand and India, spent 328 days in the latter country, and then traveled back to Thailand to its natal site in April 2021 with a total distance of 16,920 km. In May 2021, R96 launched its westward journey again to NE India. The other three kites, tagged between January and March 2021 showed similar patterns of westward movement to India. Based on GPS fixes available, juvenile *M. m. govinda*, hatched in Thailand, travelled a longer distance to India than adults (juvenile:  $3,971 \pm 1,458$  km;  $n = 3$ ) vs. adult ( $2,877 \pm 349$  km;  $n = 2$ ). For the tagged *M. m. lineatus*, designated as R197 and named Sita, left its wintering site in central Thailand in April 2021, and reached the summering site near Lena river in Yakutsk, Siberia, in early May 2021. Its presence in Siberia was confirmed through photographs by a Russian colleague on June 16 2021, but it appeared that it did not engage in any breeding activity. In August 2021, Sita launched her south-bound migration and reached Pakpli paddies on 8 November 2021, completing approximately 12,000 km latitudinal migration between Siberia and Thailand. Thus, the movement patterns of the 4 tagged kites indicate that *M. m. govinda* in Thailand is a breeding visitor, not a year-round resident as previously documented. This study provides first substantial evidence that *M. m. govinda* in Thailand is migratory.

Key words: Black Kite, *Milvus migrans govinda*, *Milvus migrans lineatus*, satellite tracking

# Preliminary report of raptor migration survey at Longquanshan, Chengdu, Sichuan, China (2020-2021)

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## Abstract

Although monitoring of raptor migration at certain watch sites is a common practice all around the world, such work is most likely still in its infancy in mainland China. Here we report two full-season migrating raptor counts from 2020 to 2021, which were conducted at Longquanshan, Chengdu, Sichuan, central China. A total of 17,128 raptors were recorded, referring to 28 diurnal raptor species. The three most abundant species counted were the Eastern Buzzard *Buteo japonicus*, Oriental Honey-Buzzard *Pernis ptilorhynchus* and Eurasian Sparrowhawk *Accipiter nisus*, successively. These three species accounted for up to 60.1% of the total, and *B. japonicus* alone for 34.7%. During the spring migration, the peak period of *B. japonicus* migration occurred at the end of March, while *P. ptilorhynchus* reached its highest daily number in mid of May. In the autumn, peak records of both *B. japonicus* and *P. ptilorhynchus* were observed in the second half of October. In order to raise public awareness of raptors, besides citizen science-based raptor counts, we also initiated public conservation educational events, such as webinars, offline talks and guided raptor-watching activities.

Key words: Raptor, migration, Longquanshan, Chengdu, China



# Raptor migration count in Kenting National Park, Taiwan

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## Abstract

Kenting, the southernmost point of Taiwan, is one of the most important watch sites along the East Asian oceanic flyway for migratory raptor monitoring. The autumn migration count has been conducted for over 30 years at the Skyline Pavilion in Sheding (21°57'13"E, 120°49'23"N, elevation 149 m), Kenting National Park. A standardized protocol has been established since 2004, with two experienced observers scanning the sky with 10×42 binoculars for 6.5 hours (0530 – 1200 hr) a day in September and 7 hours (0500 – 1200 hr) a day in October. All raptors were identified to species with records of fly direction and altitude. During the season in 2021, 370,030 raptors were observed, including 6 resident species and 11 migrants. The vast majority are Chinese Sparrowhawk (251,595 individuals, 68.0%) and Grey-faced Buzzard (117,971 individuals, 31.9%), making up > 98% of the total count. The number of Chinese Sparrowhawk declined significantly during 2004 to 2015, then recovered since 2015 ( $P < 0.01$ ). On the other hand, the number of Grey-faced Buzzards increased significantly between 2004 and 2021 ( $P < 0.01$ ), reaching a historical high throughout the survey. We suspect that prohibition of illegal hunting along the flyway might have reduced mortality during the migration period that led to population growth.

Key words: Autumn migration count, Chinese Sparrowhawk, Grey-faced Buzzard, Kenting National Park

# **ABSTRACTS**

## **Concurrent Session 6**

# Record of raptor species in the northernmost village of Badung Regency, Bali

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## Abstract

The northern area of Badung regency plays an important role as a water catchment area for Bali Island. It is a mountainous highland area, with forest and plantation area as the dominant type of ecosystem. This area is also an upstream area of Ayung River, the longest river in Bali that covers three regencies on the island of Bali. Due to the important ecological role played by this area, it is essential to carry out regular biodiversity monitoring that subsequently can be used as the basis for biodiversity management planning for the area. This study was conducted in the northernmost village of Badung regency in June 2021 by using a look-up method from three sites, which were forest edge, plantation area, and riparian area. There were three raptor species recorded, namely the Black Eagle (*Ictinaetus malayensis*), Black-thighed Falconet (*Microhierax fringillarius*), and Crested Serpent-Eagle (*Spilornis cheela*). The Black Eagle was observed flapping above the trees in the forest edge. The Black-thighed Falconet was also observed in the forest edge, perching on the tree. The Crested Serpent-Eagle was observed twice, soaring in the sky, at forest edge and plantation area. There was no record of raptor species from the riparian area. All those species recorded are protected by Indonesian laws. Regular monitoring of their existence is crucial, considering that raptor species are top predators that play a significant role in balancing the ecosystem and act as a bioindicator of environmental quality.

Key words: Raptor monitoring activity, biodiversity, birds of prey, Bali

# Correlations of climatic factors on the presence of raptor species in Prapat Agung Peninsula, Bali Barat National Park

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## Abstract

Climate change has been known to affect organisms in many aspects, i.e., the arrival of migratory species including raptor. However, few studies that focus on the effect of climate change on sedentary raptor species have been conducted. Such studies that can be useful as references in managing the potential effect of climate change toward raptor species. This study aimed to provide quantitative data on the correlation of several climatic factors on the presence of several raptor species in the Prapat Agung Peninsula, Bali Barat National Park. This study was conducted from January to April 2021, by using the look-up method to observe the presence of the raptor species. Weather data was recorded by using AccuWeather software application, and principal component analysis was conducted to determine the correlation. It was found that temperature, humidity, and air pressure had a strong correlation with the presence of raptor species in the National Park. The other factors, wind speed, cloud cover, and precipitation, had a weak correlation toward their presence.

Key words: Climate, raptor, national park, weather, West Bali

# Significance of monsoon forest for the presence of birds of prey in Prapat Agung Peninsula, West Bali National Park

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## Abstract

The monsoon forest is an ecosystem type that exists in West Bali National Park, predominantly in Prapat Agung Peninsula. The monsoon forest in the park is home to numerous animals, including birds of prey. This study aimed to determine the birds of prey species that use monsoon forests for their activity and the type of activities in Prapat Agung Peninsula, West Bali National Park. This study was conducted from January to April 2021 by using the look-up method. There were 37 sightings of birds of prey in the peninsula, consisting of three species namely the Crested Hawk-Eagle *Nisaetus cirrhatus*, the Crested Serpent-Eagle *Spilornis cheela*, and the Black-thighed Falconet *Microhierax fringillarius*. The activities performed by the birds were soaring, flapping, vocalization, and perching on the tree. Tree species that were used for perching were *Vachellia leucophloea*, *Schoutenia ovata*, *Schleichera oleosa*, and *Muntingia calabura*. The findings of this study provide recent information that can be used by the park's management to formulate conservation strategies and action plans of their conservation areas.

Key words: Activity, birds of prey, monsoon forest, national park, West Bali

# Observation on raptors in selected Central Forest Spine (CFS) ecological corridors in Peninsular Malaysia

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## Abstract

Raptors are predators to most small mammal species, especially rodents. Controlling their populations is one of the essential functions of raptors in tropical forests. The Central Forest Spine (CFS) initiative was first introduced in 2009 to re-establish the connectivity among fragmented forest landscapes in Peninsular Malaysia. In this study, raptors, among other birds, were observed using binoculars (Bushnell 10x42) at nine selected CFS ecological corridors. A total of ten species of eagles from the Accipitridae family were spotted. These birds were observed at eight corridors; no observation was made in a corridor in Pahang, CFSI PL1 (Sg Yu FR – Tanum FR). A corridor in Johor, CFSII PL3 (Panti FR – Ulu Sedili FR), recorded the highest number of eagles with nine species, followed by Kedah (CFSI SL7) with seven species and Terengganu (CFSI PL7) with three species. The most common eagle spotted throughout the study was the Crested Serpent-Eagle (*Spilornis cheela*), occurring in six corridors. This information is vital for developing more strategic monitoring on the raptor populations and understanding prey-predator relationships in CFS ecological corridors.

Key words: Avifauna, biodiversity, conservation, Malaysia

# Road transect surveys and mapping of forest raptor communities in Luzon, Philippines

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## Abstract

Forest raptor communities in Luzon are threatened by deforestation, but they remain poorly studied with only one reported survey conducted in 1994. We assessed the richness and abundance of raptor species at six forest sites by conducting point and line transect surveys along roads/trails between November 2019 and January 2020. Each site had one transect that was repeatedly surveyed using both methods at least three times by two observers on a motorcycle. We then mapped all raptor encounters to approximate the number of unique individuals per site using the plot map method. After travelling a total of 511 km, we recorded 14 species with average abundance indices (i.e., raptors per 10 km) of  $4.22 \pm 1.83$  for line transect and  $6.97 \pm 3.33$  for point transect. Species occurrence and abundance gathered from the surveys concurred with the general prevalence of the species in literature, but not for understory species. This suggests that road transect surveys can be used to study raptors that usually soar above the canopy. Point transects detected more species (Wilcox signed-rank test:  $V = 9.5$ ,  $p = 0.04$ ) than line transects. However, the latter was more time-efficient in determining abundances, as it gave comparable results with the more time-consuming point transects ( $V = 25$ ,  $p = 0.09$ ). At all sites, the plot map method gave higher richness and abundance values, providing a more complete picture of the raptor assemblage. The abundance estimates and distribution data can serve as a baseline for temporal and spatial comparisons in the future.

Key words: Line transect, point transect, survey method, forest, eagles, hawks

# Avifaunal assessment of the Capisaan Cave System, Philippines: Towards protection and conservation of endemic and migratory bird species

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## Abstract

The Capisaan Cave System is a well-known tourist destination in the Province of Nueva Vizcaya, Philippines due to its magnificent cave formations and unique forest-over-limestone cover. Its landscape is part of a larger forest community and significant biodiversity corridor adjoining the Sierra Madre Mountain Range and the Palali-Mamparang-Caraballo Mountains. Exposed to significant disturbances from nearby mining operations, deforestation, and shifting land uses, biological baseline studies were conducted that include the avifaunal assessment presented in this paper. Avifaunal survey was done using point-transect distance sampling method with the aid of point-and-shoot bridge camera in taking videos and photographs of observed species, tape recorder for auditory cues, and binoculars for better spotting of distant species sightings. A transect line was laid out and surveyed representatively covering all possible range of habitat gradients around the vicinity of two sub-cave systems, the Alayan-Lion Caves and Heaven-Sabrina Caves. The survey revealed a total of sixty-one species (61) belonging to thirty-five (35) families of birds. Thirty-six (36) species of the total birds recorded were known to be endemic to the Philippines, and of these eight (8) species [Ashy-breasted Flycatcher (*Muscicapa randi*), Blue-breasted Blue Flycatcher (*Cyornis herioti*), Grey-throated Sunbird (*Anthreptes griseigularis*), Luzon Hornbill (*Penelopides manillae*), Rufous Coucal (*Centropus unirufus*), Sierra Madre Ground Warbler (*Robsonius thompsoni*), White-browed Shama (*Copsychus luzoniensis*), and White-fronted Tit (*Parus semilarvatus*)] are categorized as threatened. The Grey-faced Buzzard (*Butastur indicus*), a migratory species, and Ridgetop Swiftlet (*Collocalia isonata*) were the topmost abundant species around the vicinity during the survey. Species richness of the two sub-cave systems were comparatively the same. Both Shannon-Weiner ( $H'$ ) and Simpson ( $S$ ) indices of species diversity of birds for Alayan-Lion Caves and Heaven-Sabrina Caves have relatively similar values, 3.149 and 0.922, and 3.395 and 0.950 respectively.  $H'$  values for both sampling sites revealed high species diversity of birds based on biodiversity scale. Both sampling sites recorded more than fifty percent (50%) species endemism, about 30% were known residents, while about eight percent (8%) were migratory birds. The high endemism and the sheer presence of these threatened endemic avian species in the sampling sites imply the area as an important bird habitat, while the abundance of *B. indicus* indicated the forest of Capisaan Cave System as a spring roosting site for migratory raptors in the Philippines which probably plays a significant part in the East Asian-Australasian Flyway (EAAF), at least for Luzon Island passage. All these make the forest of Capisaan an excellent candidate for critical habitat establishment, and to institute appropriate measures in safeguarding the site away from major and intensive anthropogenic activities and disturbances.

Key words: Avifaunal survey, Capisaan Caves, *Butastur indicus*



# **ABSTRACTS**

## **Concurrent Session 7**

# Prevalence of avian malaria in raptors in Bangphra Wildlife Breeding Center, Thailand

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## Abstract

**Introduction:** Avian malaria is considered as a significant disease threatening raptors in tropical region, and caused by Haemosporidia blood parasite, *Plasmodium* spp. Infected birds are suffered from severe anemia, hypoxia, and death especially in juvenile or migratory species which have never been exposed to the hemoparasite before (Jakthong et al. 2015; Salakij et al. 2012; Valkiūnas 2005;). Culicidae mosquitoes, play a major role in disease transmission, the survived susceptible hosts are also representatives of disease pool enhancing persistence of the disease in the wild. Bangphra Wildlife Breeding Center, Thailand is responsible for rescuing injured wildlife in the eastern region so that health check-up and investigation of such disease were implemented.

**Material and Methods:** This study was approved by the Institutional Laboratory Animal Care and Use Committee of Kasetsart University of Thailand (protocol ACKU64-VET-052). Thirteen species of confiscated diurnal and nocturnal raptors consisted of Rufous-winged Buzzard, Black Kite, Brahminy Kite, Crested Serpent-Eagle, Blyth's Hawk-Eagle, Changeable Hawk-Eagle, Mountain Hawk-Eagle, White-Bellied Sea-Eagle, Barn Owl, Barred Eagle-Owl, Brown Fish-Owl, Buffy Fish-Owl, and Brown Wood-Owl in the center were studied, 0.5 - 1ml of EDTA blood samples collected and performed hematological and molecular analyses. Packed cell volumes (PCV) and plasma protein (PP) values were obtained by microhematocrit, then thin film blood smears were simultaneously prepared, and stained with Wright's stain to evaluate parasitemia stage via microscopic examination. For molecular detection, 20 µL from each of the blood samples was DNA extracted by commercial extraction kit. Extracted DNA samples were used in nested polymerase chain reaction (nested-PCR) analyses. Four pairs of primers were required to detect specifically cytochrome *b* gene (*cyt b*) included *hemoproteus* and *Plasmodium*-specific primers based on prior literatures (Ciloglu et al. 2019; Hellgren et al. 2004). The prevalence of *Plasmodium* spp. infection was calculated. Mean PCV of both infected and non-infected samples were compared and analysed by Mann-Whitney U test (R version 4.1.1, Austria).

**Results and Discussion:** Nested-PCR analyses revealed that 9 of 18 nocturnal raptors and 4 of 56 diurnal raptor species were infected with *Plasmodium* spp. which their prevalences were 50% and 7.14%, respectively. Mean PCV values between infected, and non-infected groups of 38.5%, and 43.5%, were not statistically different. The notably higher prevalence in the nocturnal raptors could be explained that their life history is usually in evergreen forest or woodlands with dark, and humid environment, increasing the likelihood to be bitten by mosquitoes despite the prevalence of the hemoparasite in vectors is very low (Dafalla et al. 2017). Moreover, the centre was adjacent to an epidemic area of the outbreak of avian malaria

(Mahantachaisakul et al. 1996) that could promote disease distribution. On the other hands, PCV values were interestingly similar, likely attributable to the co-evolution between hosts and parasites that evolving susceptible hosts being tolerable to the clinical infection and showed less clinical signs compared to migratory raptors (Jakthong et al. 2015; Salakij et al. 2012; Valkiūnas 2005).

**Conclusion:** The present study reveals that nocturnal raptors could be more susceptible to avian malaria than their diurnal counterparts without any adverse clinical signs. Further study should investigate more raptor species in various types of habitats to find the dynamic of the disease and phylogenetic relationships between hosts and parasites to reduce the risk of natural infection especially in migratory raptors.

Key words: Avian malaria, raptors, *Plasmodium*, molecular detection

## Cerebral cyst in a Changeable Hawk-Eagle (*Nisaetus cirrhatus*)

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### Abstract

An adult Changeable Hawk-Eagle (*Nisaetus cirrhatus*) was found dead with no significant lesion observed on its superficial and visceral organs. Previous health examination showed no abnormality suggesting that the bird underwent sudden death. Necropsy resulted in no significant findings except intact living prey stuck at the upper digestive tract and nodular lesion accompanied with cerebral cyst in the cerebrum. Intact lizard body was found in the proventriculus suggesting that the bird showed odd feeding behaviour to not macerate the lizard. Thus, suffocation due to proventricular content compression was highly expected as the cause of sudden death. A cerebral cyst with nodular masses was present and might become a space-occupying lesion in the cerebrum which distorted the cerebral parenchyma and affected the centre of neural response. Histopathological examination reveals that no proliferative reaction and neoplastic growth was present. Activity of p53 expression showed no significant immunoreactivity signal. Hence, we presumed that the nodular masses came from outwards compression during the cyst formation.

Key words: Changeable Hawk-Eagle, *Nisaetus cirrhatus*, avian, cerebral, cyst

# Hematologic profile and value comparison of Changeable Hawk-Eagle (*Nisaetus cirrhatus*) with pododermatitis and ectoparasite infestation

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## Abstract

Changeable Hawk-Eagles (*Nisaetus cirrhatus*) are medium-size raptor that are commonly housed in rehabilitation facilities across Java, Indonesia. This species is protected by law; however, the IUCN Red List still classifies them as a Least Concern species, causing them to receive less concern for research. Despite their stable population number in the wild, they are represented in almost all rehabilitation centres in Java, indicating that they are somehow threatened. At the moment, no hematologic reference has been established for this species for the determination of health status. To initiate the establishment of a hematologic reference, we collected the blood of 28 Changeable Hawk-Eagles from three conservation institutions in Yogyakarta, Java. Several ancillary tests were performed to determine their health status, including physical inspection, faecal examination, blood smear assessment, and antibody detection of the avian influenza and Newcastle disease viruses. Twelve eagles were free from ectoparasites, endoparasites, blood parasites, and had no detectable antibodies for the avian influenza and Newcastle disease viruses. Ectoparasite infestations were found in eleven individuals, pododermatitis was found in nine individuals, while six individuals suffered from both diseases. We then evaluated and statistically compared the hematologic values of these four groups of eagles. Our analysis concluded that significant differences among groups only occurred in white blood cell values between the healthy group and the group with ectoparasite infestation, as well as the group suffering from both the ectoparasite infestation and pododermatitis. There was also no indication of anaemia in the three diseased groups. The result highlights the fact that inflammatory responses released to combat parasitism and parasitism with pododermatitis in this species are very much dominated by the dynamics of the white blood cells. These results can be used as a justification for therapy options with either local or systemic medication, although further considerations, such as the severity of pododermatitis, still need to be taken into account towards choosing the treatment option in response to varying white blood cell levels between individuals.

Key words: Changeable Hawk-Eagle, *Nisaetus cirrhatus*, haematology, pododermatitis, ectoparasite

# Molecular detection of influenza A viruses and H5 subtype among migratory Amur Falcons and captive birds of prey

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## Abstract

Influenza A viruses (IAVs) and Newcastle disease viruses (NDVs) are major human and animal health threats with geographic differences in prevalence, characteristics and host populations. Currently, there is sparse information on IAVs and NDVs in avian species in South Africa. Because raptors feed on live wild birds which are the reservoir hosts of IAVs and NDVs, we considered them a good sentinel for surveillance. Therefore, in addition to other resident birds of prey, migratory Amur Falcons (*Falco amurensis*) were screened for IAVs and NDVs. Oropharyngeal and cloacal samples were collected from raptor species at three sampling sites in KwaZulu-Natal Province and samples were screened for IAVs and NDVs using molecular and virus isolation methods. IAV-positive samples were further screened for the presence of H5, H7 and H9 viruses. A total of 14 samples from 11 birds (45.8% of all sampled birds) were IAV positive with Ct lower than 36 in duplicate tests. Five out of 24 birds (20.8%) were positive for IAV RNA in duplicate testing, albeit at low concentrations. Among raptor samples, three out of 24 birds (12.5%) were positive for IAVs with viral RNA detected in both cloacal and oropharyngeal swabs. One IAV-positive sample was also positive for H5 subtype (4.1%); all other samples were H5, H7 and H9 negative. Besides, all samples were NDV negative. Overall, our results support the development of more intensive and expanded influenza and other emerging virus studies in raptor species.

Key words: Influenza A virus, avian influenza, raptors, birds of prey, migratory, falcons, South Africa, surveillance, real-time reverse-transcription polymerase chain reaction, RT-PCR epidemiology, China, Mongolia, Asia

# Short-term exposure of anticoagulant rodenticides enhances the toxin tolerance in prey (*Rattus losea*) to predator (*Elanus caeruleus*)

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## Abstract

Rodenticides have been widely used around the world since the 1950s. In Taiwan, an anti-rodent operation initiated in 1977 has been a regular operation implemented by the government, until 2014. This rodent-removal operation caused many non-target species (e.g. raptors) to be poisoned by rodenticides, which became an environmental issue. The Black-winged Kite (*Elanus caeruleus*) is a small-sized diurnal raptor widely distributed in the Old World. Since 2000, a newly colonized population of this species occurs in Taiwan. Although affected by the application of rodenticides, the population is still growing and soon became the most abundant raptor in the farmlands of Taiwan. Whether the Black-winged Kite has higher tolerance to rodenticides than other raptors is still unclear. In this study, liver samples collected from Black-winged Kites from 2013 to 2016 showed annual increase of residues of rodenticide anticoagulants. The concentration of residue rodenticide was above 0.1 ppm among 46.9% of samples, which is the toxicity threshold concentration of other raptors. Not only the predators, but also the most common prey of Black-winged Kite, *Rattus losea*, also showed extended survival periods after feeding on rodenticide. The longer survival days after being poisoned can enhance the predation opportunity of raptors, thus affecting the accumulated rodenticides in the raptors. This study demonstrates that the Black-winged Kite has higher tolerance of rodenticide than most other raptors, which indicates that the raptor can quickly enhance tolerance within a short period of time.

Key words: Anticoagulant rodenticides, Black-winged Kite, brodifacoum, food chain, tolerance

# **ABSTRACTS**

## **Concurrent Session 8**



# Genetic relationships in Black Kites (*Milvus migrans*) from Northeast Asia, Japan, Taiwan, India and Australia

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## Abstract

The Black Kite *Milvus migrans* is one of the most widespread birds of prey, occurring over most of Eurasia, Africa and Australia. The species displays a unique ecological flexibility and is found in habitats ranging from northern taiga to steppe, including human-impacted landscapes. The Black Kite is thought to have from five to seven subspecies that occupy vast geographic ranges. The Palearctic is populated by two subspecies, with the European Black Kite *M. m. migrans* occurring in the west and the Black-eared Kite *M. m. lineatus* occurring in the east (including Japan). India and Indo-China are inhabited by the Pariah Kite *M. m. govinda*, and Australia and its adjacent islands are inhabited by the Fork-tailed Kite *M. m. affinis*. The Taiwan Kite *M. m. formosanus* is recognized as inhabiting the eastern part of China, Taiwan and Hainan Island. This subspecies was described from phenotype (Kuroda, Nagamichi, 1920) and no genetic data are available, so genetic relationship and distance between *M. m. formosanus* and other Asian subspecies remains unknown. In this respect, Black Kite population in Japan remains unexplored as well, although it looks rather isolated from the mainland population and may differ genetically. We have previously found out that populations from Europe, northern Asia and India all had separate haplogroups of the mitochondrial *cytochrome b* (*CytB*) gene. The European and North Asian subspecies were isolated in the Pleistocene and spread across the northern Palearctic following climate amelioration, forming a broad intergradation zone from western Siberia and Kazakhstan to Eastern Europe. However, low variability of the *CytB* gene did not allow to find differences between Indian and Australian populations, which shared the same haplogroup. Now we for the first time analysed *CytB* gene together with *ND2* (*NADH dehydrogenase subunit II*) mitochondrial gene in Black Kites from populations in Northeast Asia, India, Taiwan, Japan, and Australia. We found that Japanese kites carry only one of the two major haplogroups of the Asian *M. m. lineatus*, which favoured recent isolation from the mainland population. The haplogroups of Indian and Australian kites turned out to be different, but very close, i.e. these populations had split relatively recently. Among the nesting kites in Taiwan, we found carriers of both *M. m. lineatus* haplogroups as well as carriers of a new haplogroup that we had not found in other Asian populations. We assume that this new haplogroup is inherited from the subspecies *M. m. formosanus*, which previously lived in this area and was genetically different from *M. m. lineatus*. Probably, the recent decline in the local population, as well as the *M. m. lineatus* expansion have led to the fact that Taiwan is now inhabited by the descendants of both subspecies, which likely interbreed freely. In addition, the strong decline in kite numbers in the 1980s probably led to

the formation of two isolated genetically different populations of the Black Kite in Southern and Northern Taiwan.

Key words: *Milvus migrans*, phylogeography, *cytB*, cytochrome B, NADH dehydrogenase subunit II, ND2, *M. m. formosanus*, *M. m. lineatus*, *M. m. govinda*, *M. m. affinis*

# Analysis of genetic structure and genetic diversity in Japanese Black Kite population using mtDNA

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## Abstract

The Black Kite (*Milvus migrans*) is a species of medium-sized raptor that is widespread in the Old World. The Black-eared Kite (*M. m. lineatus*) is a common raptor species in Japan, but there are few examples of regional breeding trends and genetic research. Due to the overall decline of raptor populations and for future conservation policy, and to reconsider the natural history of Black Kite in East Asia, we analysed the genetic structure and genetic diversity of the Japanese kite population. We collected feathers or feces samples of 59 Japanese kites from 22 sites all over Japan, extracted DNA, determined 1585 bp from the cytochrome b (cyt b) gene to the Control Region (CR) of the mtDNA, and performed population genetic analysis. As a result, 6 haplotypes were detected in 59 individuals: 50 individuals had haplotype Mm1, 5 individuals had haplotype Mm5, and the remaining 4 individuals had a different haplotype each (Mm2, Mm3, Mm4 and Mm6). Mm2, Mm3, Mm4 and Mm6 each differed 1 bp from Mm1, while between Mm1 and Mm5 there was a difference of 3 bp. There was no regional bias in the detected haplotypes, and Mm1 and Mm5 were evenly detected nationwide. When the mtDNA fragments were divided into cyt b and CR, cyt b had two mutation sites and three haplotypes, while CR had five mutation sites and five haplotypes were detected. As a result of network analysis, a star shape centred on Mm1 was shown. Neutrality tests showed negative values for both Tajima's test and Fu's  $F_s$ . The results of the Mismatch distributions test showed no significant difference in either SSD or  $r$  values. These results indicated that the Japanese kite population is undergoing population expansion. Phylogenetic analysis using the obtained DNA data and the DNA data in the NCBI Genbank database indicated that the Japanese kite population can be divided into two groups, one centred on Mm1 and the other group on Mm5. Since the sequence of Mm1 was exactly the same as found in the Korean kite population, it is likely that the Japanese kite population originated from the Asian continent and expanded its distribution throughout Japan. The population possessing haplotype Mm5 could have also been derived that way, or a new haplotype was derived in Japan from the Mm1 population. Furthermore, the genetic diversity of the Japanese kite population was  $0.304 \pm 0.075$ . Comparison with the genetic diversity of other raptors in Japan showed that the Japanese kite population has low genetic diversity. The Japanese kite population has been well maintained and has not experienced any drastic population decline. Therefore, the reason for the low genetic diversity may be that the arrival of a small population to Japan is a recent event. Our study suggests that the natural history of the Japanese kite population is that individuals from at least two separate populations invaded Japan very recently and are now in the process of expanding their distribution while increasing their numbers.

Key words: Population genetics, Black Kite, mtDNA, genetic diversity, phylogeny

# Extent and symmetry of tail moult in Amur Falcons

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## Abstract

Amur Falcons *Falco amurensis* undergo one of the most extreme migrations of any raptor, crossing the Indian Ocean between their Asian breeding grounds and non-breeding areas in southern Africa. Adults are thought to replace all their flight feathers on the wintering grounds, but juveniles only replace some tail feathers before migrating. We compare the extent and symmetry of flight feather moult in a large sample of Amur Falcons killed at communal roosts during two hailstorms in KwaZulu-Natal, South Africa in March 2019, shortly before their northward migration. Most adults had completed replacing their remiges, with only a few still growing 1–3 feathers (mainly secondaries), but most were still growing their tail feathers. Juveniles only replaced tail feathers. Moult typically was distal from the central rectrices, but 25% of adults and 1% of juveniles replaced the outer tail first, and a few individuals exhibited other moult patterns (simultaneous moult across the tail, or among the inner and outer feathers). These different moult strategies were independent of sex. Adults that replaced the outer tail first typically had replaced a greater proportion of the rectrices (mean  $\pm$  SD;  $0.81 \pm 0.19$ ) than adults starting from the central tail ( $0.17 \pm 0.08$ ). Proportionally fewer distal moulting adults were killed on 9 March than 21 March, resulting in the average proportion of rectrices replaced by adults decreasing between the two storm events from  $0.52 \pm 0.26$  to  $0.43 \pm 0.23$ . By comparison, juvenile tail moult increased from 9 March ( $0.34 \pm 0.18$ ) to 21 March ( $0.40 \pm 0.15$ ). Overall, the probability of replacement for T1 was similar for adults (0.82) and juveniles (0.83), but adults were more likely to have replaced T2–6 (0.40–0.45) than juveniles (0.18 for T2 and 0.04–0.07 for T3–6). Asymmetry in tail moult was greater at T1 for adults (15%) than juveniles (10%), but asymmetry for T2 to T6 was greater in juveniles (3–10%) than adults (1–4%), especially given the greater probability of feather replacement in adults. Despite these differences, the degree of asymmetry was less than expected by random replacement across all rectrices in both age classes. Interestingly, moult tended to be more advanced on the left than right side of the tail. The extent of tail moult was correlated with body condition in adults and juveniles, suggesting that moult pattern might be used as an indicator of fitness in falcons.

Key words: moult pattern, asymmetry, adult, juvenile, body condition, *Falco amurensis*

# **Blood cells morphometry and descriptive morphology of captive Changeable Hawk-Eagles (*Nisaetus cirrhatus*) at Wildlife Rescue Centre Jogja**

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## **Abstract**

Providing qualitative and quantitative haematologic references of neglected captive wild animals is pivotal for health management within the sanctuary. Changeable Hawk-Eagles (*Nisaetus cirrhatus*) are abundantly kept in the sanctuary with no haematologic reference ever reported. This study aimed to present the morphology and morphometry references of the Changeable Hawk-Eagle's blood cells as the standard for haematologic count. We collected and prepared the peripheral blood smears with 10-fold diluted Giemsa stain from eight Changeable Hawk-Eagles in the Wildlife Rescue Centre Jogja, following the standard procedures. All slides were observed and captured under a camera-equipped microscope. Evaluation of the morphology and morphometry aspects were conducted using ImageJ version 1.52a. As the Changeable Hawk-Eagles are naturally present as dark and bright morphs in colour, the blood cell morphometric parameters were statistically compared based on the morph groups. The species' erythrocytes were oval-shaped with an occasional variation. Leukocytes consisted of polymorphonucleated granulocytes – with the exception of basophils that lacked nuclear lobulation – and mononucleated agranulocytes. There were significant differences ( $P < 0.05$ ) on all erythrocyte morphometric parameters, heterophil diameter, and lymphocyte diameter between the dark and bright morph groups. Overall, the morphological properties of the Changeable Hawk-Eagle's blood cells were visually identical to other avian species, although the blood cells morphometry might be comparatively different.

Key words: Erythrocyte, haematology, leukocyte, measurement, raptors

# **Blood profile of Barn Owl (*Tyto alba javanica*) in Cancangan, Wukirsari, Cangkringan, Sleman, Yogyakarta**

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## **Abstract**

Barn Owl (*Tyto alba javanica*) has an important role in maintaining the balance of nature, especially related to human welfare. Therefore, the biological aspects that influenced the survival and breeding of the Barn Owl need to be known. This study aims to determine the blood profile of the Barn Owl between care cages and owl houses in rice fields in Cancangan, Wukirsari, Cangkringan, Sleman. This study used nine blood samples of Barn Owl with an estimated age between juvenile to adult. 0.5 ml blood was withdrawn from the brachial vein using a 1 ml disposable syringe with a 25G needle. Samples were tested in the laboratory of Prof. Soeparwi Animal Hospital. Blood images were analysed using several methods. Hemoglobin was examined using the Sahli method, hematocrit using microhematocrit tubes, erythrocytes, and leukocytes using the hemocytometer counting method, and differential leukocytes examination using the manual counting method. Barn Owls placed in care cages (n = 5) showed higher hemoglobin levels, percentages of hematocrit, total number of leukocytes, MCV values, MCH, MCHC, lymphocyte and heterophile than owls taken from owl houses in rice fields (n = 4). Barn Owls obtained from care cages and owl houses were found to have abnormalities in the legs and prolapse in the cloaca. In this study, several blood parameters of the barn owls in the care cages were higher than those in the owl houses in the rice fields and they did not show a normal range for the Barn Owl as a representative of the population in Cancangan. This is due to the small number of samples in the study and abnormalities were found in some owls. It is necessary to conduct more studies on complete examination of blood parameters using a larger number of samples and relationship between the blood profile and the physical conditions of the Barn Owl.

Key words: Barn Owl, blood, Cancangan-Yogyakarta

# **Synopses**

## **Post-symposium**

### **Workshops**

## Workshop 1: Occupancy Modelling 1

Ravinder Kaur\*

*Gaia, Malaysia*

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### **Synopsis:**

In the study of ecology, we are often curious about species abundance or occupancy, distribution and richness and the parameters that influence these quantities. Hence, this workshop will be an introduction to occupancy, data that involves presence and absence at a ‘site’, of which could be either in a linear form or in the form of grids. We will examine hierarchical models and how measurement errors are addressed in these mathematical models because absence of a species in the field does not necessarily mean true absence of the species. It could merely be undetected by the observer during that particular field visit. We will also run a few scripts on R studio.

### **About the presenter:**

Ravinder is a hornbill specialist and the Scientific Director of Gaia, an organisation dedicated to hornbill conservation in Malaysia. She recently published a paper estimating the availability of potential hornbill nest trees in a secondary forest patch in Kinabatangan, Sabah, an important nesting resource for hornbills.

## Workshop 2: Occupancy Modelling 2

Hankyu Kim\*

*Department of Forest and Wildlife Ecology, University of Wisconsin-Madison, Wisconsin, United States*

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### **Synopsis:**

Following the “Introduction to Occupancy Modelling 1” workshop, we will go through examples of how occupancy modelling can be used for raptor research, i.e., to test differences between groups, find habitat associations, and predict species distributions. As in any ecological modelling practice, model evaluation is essential to show that the model is appropriate. We will practice a few model evaluation methods available for occupancy models. In addition, if time allows, we will briefly cover multi-season occupancy models for understanding temporal change or dynamics. Lastly, we will look at how we should present occupancy analysis results and the limitations of occupancy analysis. First, I will explain the concepts and key ideas (30 minutes), then we will work on analysis examples and questions (20 minutes). While we will not be able to cover the basic use of R in detail in this workshop, we aim to share the basic concepts of ecological modelling and practice with R and the R package ‘unmarked’.

### **Notes:**

We will share example codes and data for the course by mid-January, before the conference. Please download and install the most recent version of R and Rstudio (this is not required for analysis, but for convenience), and the R packages ‘unmarked’ and ‘tidyverse’ before the workshop.

### **Programs to install:**

Where to download R: <https://www.r-project.org>

Where to download: <https://www.rstudio.com>



**Packages – you can install them with `install.packages(“packagename”)` function:**

Package unmarked: <https://cran.r-project.org/web/packages/unmarked/unmarked.pdf>

Package tidyverse: <https://www.tidyverse.org/>

Installing these two packages can take some time. So please install ahead of the workshop.

**About the presenter:**

Hankyu Kim is currently working as a post-doctoral research associate at Zuckerberg Lab in University of Wisconsin-Madison. His current research is on predicting distribution of abundance of breeding birds in Wisconsin using hierarchical models. He obtained his Ph.D. on breeding bird population response to climate change and land use change at Oregon State University in 2021. He finished his master’s degree on sexual dimorphism and dietary niche segregation of Oriental Scops-Owl and Northern Boobooks in South Korea at Seoul National University. Hankyu participated in ARRCN’s fall raptor migration count at Jeju Island and Busan, Korea in 2013.

### Workshop 3: Species Distribution Modelling

Loo Yen Yi\*

*University of Auckland, New Zealand*

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**Synopsis:**

Species distribution modelling (SDM) allows us to predict the distribution of a species outside of our sampling range, which is helpful to make better conservation decisions. SDM has two components: the coordinates of occurrence data and environmental layers. In this workshop, we will cover the basics of SDM and how to do it using R codes and materials will be shared with participants.

**About the presenter:**

Yen Yi is an early career researcher interested in bird biology and behaviour. Her background is BSc environmental science from the University of Nottingham Malaysia, including tropical ecology, GIS, and environmental management. She did her Masters research at Manchester Metropolitan University (UK) on the migratory strategies in tyrant-flycatchers using species distribution modelling and continental-scale citizen science data. She is currently studying the vocal behaviour of birds for her Ph.D. at the University of Auckland (New Zealand).

### Workshop 4: Raptor Tracking Technology/ Devices

Hansoo Lee\*

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**Synopsis:**

In this workshop, we are going to discuss a variety of recent technologies to remotely track raptors. It will introduce the various methods used for wild raptor tracking, mainly for students and researchers who are new to the study of raptors. I will describe the technical characteristics of VHF Radio Transmitter, Satellite Transmitter, GPS-GSM (GPS-Mobile) Transmitter, Geolocator, etc., and the appropriate tracker type for each species of raptor. In the discussion, migratory bird tracking information obtained by attaching a tracker to various raptors will be used to help participants better understand its usage. Also, we will practice attaching the harness line without harming the bird. Since it is important to safely capture raptors in order to attach tracking devices, some methods of catching raptors used in the field will also be introduced.

**About the presenter:**

Since 2010, I have been interested in wildlife tracking devices and started developing the device in cooperation with IT engineers. At that time, I decided that it could be an efficient device by combining advanced mobile phone and GPS technologies. As a result, the commercially available WT-300 tracker was produced in 2015. Up to now, the tracker developed by us has been actively used in research on migration of more than 100 species of birds and mammals.

**Education**

- Doctor of Philosophy in Department of Biological Sciences, August 1998
- Northern Illinois University, DeKalb, Illinois, USA

**Experiences**

- Director General, Korea Institute of Environmental Ecology, 2000 - Present
- Adjunct Professor, Department of Biology, Donga University, 2005 - 2012
- Coordinator, Baikal Teal Task Force of Anatidae Working Group, 2002 - 2008
- Vice President, Korean Society of Ornithology, 2013 - 2017

## Workshop 5: Handling Injured Raptors

Jalila Abu\*

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**Synopsis:**

Injured raptors can be aggressive and sensitive to direct handling. This workshop intends to share knowledge and skills needed in handling injured raptors ranging from housing, feeding and treating these birds. Advice from a veterinary perspective on inspection on common injuries, collecting data for recovery assessment and where to seek professional help is also given. Procedures and permits in handling raptors are also discussed.

**About the presenter:**

Jalila completed her Doctor of Veterinary Medicine and Master of Science degrees at the University of Agriculture Malaysia (now known as Universiti Putra Malaysia) in 1990 and 1994, respectively. She earned a Ph.D. in Avian Surgery, Anesthesiology and Radiology, running concurrently with a specialist training programme in Pet and Wild Bird Medicine and Surgery at the University of Minnesota, USA in 2002 before she joined Universiti Putra Malaysia as a senior lecturer and became a full professor in 2019. Currently, she is the Deputy Dean of Veterinary Teaching Hospital of the university and was heading the Avian and Exotic Unit and Avian Consultants at the university prior to that. She is also the Malaysian representative

of the European Association of Avian Veterinarians and a member of the American Association of Avian Veterinarian and World's Poultry Science Association (Malaysia Branch). Since 2002, she has become a clinical consultant at the University Veterinary Hospital performing health examination on bird cases, soft tissue and orthopedic surgeries and serves as an avian health consultant in various organizations and companies. Her main research interests are in the area of avian medicine and surgery particularly in infectious diseases and bone grafting in birds.

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