Dr. B. Ramakrishnan, M.Sc., Ph.D.,

Assistant Professor in Wildlife Biology,
Department of Zoology and Wildlife Biology,
Government Arts College, Udhagamandalam,
The Nilgiris, Tamil Nadu - 643 002

Member in Various National & International Forum

Member - IUCN/SSC - Asian Elephant Specialist Group
Member - National Biodiversity Authority - Invasive Alien Species
Member - State Board for Wildlife - Tamil Nadu State
Member - State Level Steering Committee - Nilgiri Biosphere Reserve
Member - NTCA - Mudumalai Tiger Reserve - Governing Body
Member - NTCA - Sathyamangalam Tiger Reserve - Governing Body
Contact - +91 9444799844, E mail ID- bio.bramki@gmail.com

He has completed his post-graduation and Ph.D.,in Wildlife Biology in A.V.C. College, Mayiladuthurai. He has started his carrier as a Junior Research Fellow and Senior Research Fellow in Salim Ali Centre for Ornithology and Natural History (SACON), Coimbatore. He worked as a Senior Research Fellow in A.V.C College (Autonomous) from 2002-2003. He worked as a Senior Research Fellow in WWF-India from 2004 to 2005 and as a Field Officer in Wildlife Trust of India from 2007 to 2010. Since 2011, He is working as an Assistant Professor of Wildlife Biology in the Department of Zoology and Wildlife Biology at Government Arts College, Udhagamandalam, The Nilgiris, Tamil Nadu. Presently, 8 Ph.D and 3 M.Phil students are pursuing their research under his supervision. So far 7 M.Phil and 40 M.Sc students have completed their dissertations under his supervision. He has published 67 research papers in national and international peer reviewed journals and he delivered 27 oral presentations at national and international workshops, seminars, conferences and symposia so far. He is one of the editors in Aftermath of Diclofenac and Vulture Population (2008), An Anthology of Nilgiri Biosphere Reserve (2013) and Aftermath of Diclofenac and Vulture Conservation in Nilgiri Biosphere Reserve-Moyar Valley (2016). He has published two books on Asian elephants. As a Principal Investigator and Co-Principal Investigator he has completed 25 research projects so far.

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SECURING VULTURE POPULATION IN SOUTHERN INDIA Edited by B. Ramakrishnan

SECURING VULTURE POPULATION IN SOUTHERN INDIA

Proceedings of the Workshop Conducted from 8th to 9th January 2018

Edited by

B. Ramakrishnan

Govt. Arts College Udhagamandalam

R·R·C·F

Indo American Wildlife Society

TNFD

2018

SECURING VULTURE POPULATION IN SOUTHERN INDIA

Edited by

B.Ramakrishnan

2018

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Fore word

Vulures play a vital role in the hygience of the Forest Eco-system, as they are the efficient scavengers and dispose of the dead animals of the forest in the best manner to prevent any infection and disease. The doyen of Indian Ornithology, Dr. Salim Ali says, “Vultures are God’s own incinerators, which cannot be replaced by even the most sophisticated ones which humans may invent”! A flock of vultures has the ability to dispose of an Ox in just 30 minutes!

Their sudden decline was noticed in the 1990’s as the population of them plummeted by 90% and a study in Pakistan attributed it to indiscriminate use of the veterinary drug Diclofenac. But this was mainly on the population around villages and towns and the forests. There were no data as to hos many were affected by NSAIDs or how the population dynamics got altered.

This is the focal point of this Workshop held in Udhagamandalam with the theme of “Securing Vulture Population in Southern India” since the last known population in all the Southern States were discussed and also their current status. The aim to conserve this last thriving population is the bottom line of the papers presented.

I am happy to note that papers from Telangana and Andhra Pradesh where few Vultures are seen, have been presented along with some path breaking studies by Toxicologists and Veterinarians on NSAIDs and their impact on Vulture population. Of course, the major population as of now is seen along the Moyar Valley in Tamil Nadu, on which due focus has been given!

It is a unique congregation of Scientists and Enthusiasts working for Vulture Conservation and the findings in their States have been collated for future plans in saving these Critically Endangered Species from extinction.

The Group Discussions have brought out many useful suggestions to implement and I congratulate the Organisers for having conducted a noteworthy Workshop on critically endangered species. I wish they continue with a blueprint for securing this population for posterity and Tamil Nadu Forest Department will be keen to render all support to the revival of these “God’s own Incinerators”.

T.P. RAGHUNATH, I.F.S.,
Principal Chief Conservator of Forests &
Chief Wildlife Warden

TAMIL NADU FOREST DEPARTMENT

S.RAMASUBRAMANIAN, I.F.S.
Conservation of Forests

Preface

Raptors are the apex predators in the avian community due to their magnificent flight and hunting skills enamoured by acute vision and powerful talons. They can fly in the sky on motionless wings effectively using the thermals. Vultures, in particular are exponents of seemingly effortless flying with their fabulous soaring capacity. At the same time they do commendable job in the ecosystem by scavenging dead animals and thereby ridding the forest of dangerous diseases. But for the banning of the harmful drug named “Diclofenac” in India in 2006, for veterinary use, their population adjoining human habitation would have been wiped out, Vultures are closely asociated with the presence of carnivores as camp followers. Sometimes the carnivores tend to kill the cattle in the nearyby villages provoking retaliatory poisoning of the carcass to eliminate them. This unintended act is also a major threat to the Vultures as many such instances of mass death were reported in the Nilgiris Biosphere Reserved earlier.

This two days workshop at Udhagamandalam from 8th-9th, January, 2017 was organised as a sequel to the previous two workshops held in Sathyamangalam and Udhagamandalam during 2008 and 2010 respectively. This time experts from the adjoining states viz, Kerala, Karnataka, Telangana and Andhrapradesh also participated to provide a pan Indian perspective in Vulture conservation. It was a valuable experience and enlightenment for having the privillage of interacting with National and International experts whos have contributed significantly across the globe.

The organisers meticulously brought out the book entiled “Securing vulture populations in Southern India” with a conservation action plan emanated from the group discussions by the renowned experts which include scientists, researchers, veternarians, NGO representatives, conservationists and naturalists in the southern states as well as across the world. This book also embodies 28 research papers under 4 chapters covering the strategic aspects of present status and distribution, conservation issues and mangement implications on vultures in southern India. This is a welcome step and a giant leap from the previous two workshop which would surely translate the action plan into reality.

As dutiful citizens, we have the moral obligation to take all possible measures to bring back the vulture populations to ensure natural disposal mechanism in the forest ecosystem.

I also would like to profusely congratulate the organizing secretary and the editor of this book, Dr. B.Ramakrishnan and his assistant Mr. A.Samson for their earnest effort to bring this book with a treasure of knowledge to the public domain.

S. RAMASUBRAMANIAN, I.F.S.

Message from the Principal's Desk

Dr. M.Easwaramurthy, M.Sc.,M.Phil.,Ph.D

I have great pleasure as the Principal of the Government Arts College, Udhagamandalam, The Nilgiris to give message of the book entitled "Securing vulture population in southern India" edited by our faculty Dr.B.Ramakrishnan, Assistant professor of Wildlife Biology, Department of Zoology & Wildlife Biology for brought out conservation action plan for the conservation of vultures in southern India.

The planet earth is inhabited by diverse array of living organisms such as micro organisms, plant and animals and human beings, which collectively constitute the Biodiversity. Thus, the diverse arrays of biotic components are interdependent and interacting with one another, so as to sustain their own existence and the habitat and environment in which they live. The Nilgiris Biosphere Reserve is one of the world heritage sites and is the first and foremost biosphere reserves in India declared by the UNESCO which has variety of the species including both flora and fauna. The vultures in this biosphere are very important and play vital role in the ecosystem as scavengers. So their presence is highly needed one.

I am very happy that our college has involved to bring out centralized action plan by this book for the long run conservation of endangered and critically endangered vulture species, not only in the Nilgiris, but almost for entire south India.

This book, I am confident, contains presentations of eminent personnel both form national and international and their research articles are have the potential to create a strong awareness and conservation strategies to various stakeholders on vultures.

On behalf of the college and being its Principal, I am proud to be a part of publishing this book. I congratulate the editor and the faculty from our college Dr.B.Ramakrishnan for organizing the workshop and bring out the proceedings as a book. I wish him all success.

(Dr.M.EASWARAMURTHY)

PRINCIPAL

Acknowledgements

I express my sincere thanks and gratitude to Thiru. T. P. Raghunath, I.F.S., the Principal Chief Conservator of Forests & Chief Wildlife Warden of Tamil Nadu for granting permission to conduct this workshop and given foreword for the proceedings. I express my sincere thanks to Thiru. Srinivas R. Reddy, I.F.S., the Chief Conservator of Forests & Filed Director, Mudumalai Tiger Reserve & Mukurthi National Park for providing continuous support to me and delivered the presidential address during the inaugural session of the workshop. My heartfelt thanks to Thiru. S. Ramasubramanian, , I.F.S., the Conservator of Forests, Coimbatore Circle for supporting various ways not only for this workshop, previous two workshops also held in 2008 at Sathyamangalam and Udhagamandalam in 2011 for his advice and uncomplaining assistance during the workshop as well as all logistics provided during field visit to the participants. I am thankful to Thiru. S. Kalanithi, I.F.S., the District Forest Officer, Nilgiri North Forest Division for his unfailing support rendered in many ways for the successful completion of the workshop and field visit. I express my sincere gratitude to all Forest Range Officers in the Nilgiri North and South Forest Divisions especially, Thiru. Selvam (Sigur Range) and Thiru. Muthukrishnan (Nilgiris North Range) and Mr. Siddaraj (Forester, Sigur Range) for providing necessary facilities and logistics to the participants during field visit.

My whole hearted thanks to our Principal (i/c) Thirumathi. V.Mallika for permitting me to conduct this workshop and delivered inaugural address in the workshop. I express my thanks and gratitude to the principal Dr. M. Eswaramoorthy for giving message and supporting our activities to the department. I record my sincere thanks to our Head of the Department Dr.J Ebanasar for his continuous advice and encouragement. I am thankful to all my colleagues in the department for providing necessary helps during the workshop. I thank all our office staff for helping in various ways especially releasing funds in right time and verifying vouchers, auditing bills and finally issuing utilization certificates to respective donors.

This workshop would not be possible without financial support. My sincere and heartfelt thanks to my sponsor of the workshop the Raptor Research & Conservation Foundation, Mumbai, especially I thank Mr. Kiran Srivastava for releasing major amount of funds in right time for the successful completion of the workshop. My sincere gratitude to the co-organizers namely the Tamil Nadu Forest Department and Arulagam for providing partial financial support and providing all logistics to the workshop. I thank all the collaborators namely, CSIR-India, NWEA, OSAI, NCS and IAWS who have helped by providing small grants and supplying required materials to the workshop.

This workshop and the proceedings was successfully completed mainly because of my Ph.D., Research Scholar Thiru.A.Samson's effort, commitment and dedication start from communicating the participants, receiving the papers from the presenters by sending reminders and coordinating with me for wonderful field visit and so on. I record my sincere and whole hearted thanks to him.

My sincere thanks are due to the research scholars of my lab, Mammalogy & Forest Ecology and neighbouring lab Herpetology & Tribal Medicine for untiring assistance provided for successful completion of two days workshop and one day field visit. I am very much thankful to Mr. S.Chandrasekar, Freelancer, Chennai for helping me in various ways and giving valuable comments and suggestions for this proceedings. I express my gratitude to Dr. Jayshankar, Assistant Professor in English for critically gone through this document.

(B. RAMAKRISHNAN)

Organizing Secretary & Editor

BACKGROUND

The vultures play a vital role in the ecosystem as a scavenger by habit. It is noteworthy to mention that the scavengers occupy an imperative and final level in the ecosystem without which the recycling or proper disposal, especially that of dead and decaying materials will be either stopped or delayed, leading to chaos. There are nine species of vultures found in the Indian Subcontinent. Of which, four are found in Southern India, namely Egyptian Vulture (*Neophron percnopterus),* Red-headed Vulture (*Sarcogyps calvus),* White-rumped Vulture (*Gyps bengalensis)* and Long-billed Vulture (*Gyps indicus).* These four species of vultures are spread out in continuous forest tracts of Western Ghats and Eastern Ghats areas of five states namely Tamil Nadu, Karnataka, Kerala, Telangana and Andhra Pradesh in South India. These are considered to be the wild and viable vulture populations in India south of the Vindhyas. Apart from this, stragglers of Cinereous and Himalayan Griffon have also been recorded in south India. Due to jurisdiction limits the information collected or research done by various personnel or authorities are not shared or not brought under one umbrella. However all five states are trying to secure these vulture populations which nests in one state, roosts and forage in another state or they do all or part of these activities in varying proportion in the same contiguous landscape of the Western Ghats and Eastern Ghats areas in southern India. The aim of the workshop was to share the findings and management implications initiated by five state forest departments, researchers and NGOs for securing our country's southern wild and viable vulture population under centralized action plan for the first time in our country.

The rapid collapse in vulture populations in India has led to a breakdown in natural ecosystem services coupled with one of the slowest rates of reproduction. This has necessitated the urgent need to introduce various conservation action plans in the country in order to bring back vulture population. Two days workshop was organized from 8th to 10th January, 2018 and one day field visit on 11th was intended to highlight the current key issues such as present population status, breeding status, usage of diclofenac and other NSAIDs and exigent measures needed to protect vulture populations in the southern India by bringing together scientists, researchers, toxicology experts, conservation organizations and NGOs to share their findings with the five state forest department officials. The purpose was to jointly discuss and bring out a centralized action plan with viable management solutions in each state to secure the country's southern wild and viable vulture populations.

AIM

- Securing vulture population in Southern India

SPECIFIC OBJECTIVES

- ❖ To share population estimations, research findings, nesting status, conservation threats and management implications on vultures of five states in southern India
- ❖ To discuss the issues and solutions and
- ❖ To formulate holistic and centralized action plan for securing wild and viable vulture population in southern India.

SYNOPSIS OF THE WORKSHOP

After the formal inauguration, one full day was dedicated for presentations by various experts, scientists, researchers, NGO representatives and officials of forest departments on population estimation, scientific research studies, awareness programmes and management implications already done or under process in all five southern states. The first session of the second day was given to Arulagam to present blue print for vulture conservation action plan with respect to prevalence of NSAIDs. Due to objection raised by the gathering none of the plan from the Arulagam was considered and the gathering directed the outcome of the workshop should be a Blue Print for Vulture Conservation in Southern India. This was followed by a half of the second day for group discussion by two groups namely 1) Standardizing methodology for vulture population estimation & Research activities and 2) Conservation threats & Management implications to discuss feasible actions that have been already carried out as well as handicapped or required for the successful management of vulture populations in southern India. By pooling various groups' comments and suggestions a holistic and centralized vulture conservation action plan was prepared for the long run conservation of the country's southernmost wild and viable vulture population in southern India. The last session of the second day was given for presentations which were left out on day one. Finally formal valedictory session was conducted with the end of group photo along with vulture model and vote of thanks. The third day was spent for field visit in the Nilgiri North Forest Division to see one of the White-rumped Vulture nesting site (Jagalikadavu Nesting Site).

INAUGURATION

Date: 08/01/2018 Venue: HADP Hall, Udhagamandalam

Time	Programme	Resource Person
09.30am-10.00am	Registration and issuing Name/ Organisation tags	
10.00am-10.05am	Tamizhthaai Vaazhthu and Lighting Kuthuvilakku	
10.05am-10.15am	Welcome Address	Dr.B. Ramakrishnan, Ph.D. Assistant Professor in Wildlife Biology and Organizing Secretary of the workshop, Government Arts College, Udhagamandalam
10.15am-10.25am	Inaugural Address	Thirumathi. V. Mallika, The Principal (i/c), Government Arts College, Udhagamandalam.
10.25am-10.35am	Key Note Address	Thiru.S. Ramasubramanian, I.F.S The Conservator of Forests Coimbatore Circle
10.35am-10.45am	Workshop Abstract Released by Received by RRCF Project Final Report Released by Received by	Thiru.Vijaykumar, I.F.S District Forest Officer Ramnagara Division Thiru.S. Ramasubramanian, I.F.S The Conservator of Forests, Coimbatore Circle. Thiru. Sajan, I.F.S Wildlife Warden, Wyanad Wildlife Sanctuary. Thiru. Kiran Srivastava Raptor Research and Conservation Foundation, Mumbai.
10.45am-11.00am	Honouring Ceremony	Dr. Robert B Grubh, Ph.D (who is the first Ph.D., holder on vulture research in India)
11.00am-11.10am	Presidential Address	Thiru. Srinivas R. Reddy, I.F.S, Chief Conservator of Forests and Field Director, Mudumalai Tiger Reserve and Mukkurthi National Park, Udhagamandalam
11.10am-11.20am	Honouring dignitaries, sponsors, joint organizers and collaborators by presenting Mementos	
		Tea Break
11:20 am onwards	Technical Session started	

INAUGURAL SESSION

From left to right: Dr.B.Ramakrishnan, Mr.Kiran Srivastava (RRCF) Mr.S.Ramasubramanian, IFS., Mr.Srinivas.R.Reddy, IFS., Tmt.V.Mallika., Mr.N.T.Sajan., Mr.S.Kalanithi,IFS., Mr.Vijaykumar, IFS

Mr. Srinivas R.Reddy, IFS., the Chief Conservator of Forests & Field Director, Mudumalai Tiger Reserve lighting Kuthuvilakku

Mr. Srinivas R.Reddy, IFS., releasing RRCF's Vulture Project report and received by Mr.S.Ramasubramanian, IFS., the Conservator of Forests, Coimbatore Circle

Dr.Robert B Grubh, the first Ph.D., holder on Vultures in the country is being honored by his student Dr.N.Sivaganesan

Mr.Chris Bowden (RSPB, UK) honoring forest range officers working in the Vulture habitats

Mr. Selvan, Sigur Forest Range Officer, Mudumalai Tiger Reserve

Mr.Chris Bowden (RSPB, UK) honoring forest range officers working in the Vulture habitats

Mr. Ramesh, NES Forest Range Officer, Mudumalai Tiger Reserve

ORAL PRESENTATIONS

TECHNICAL SESSION – I
STATUS, SURVEY AND POPULATION ESTIMATION OF VULTURES

The current threats and status of Asian vultures -

By **Mr. Chris Bowden,**
Globally Threatened Species Officer & SAVE Programme Manager, UK Address: RSPB,
The Lodge, Sandy, Beds SG19 2DL

Mr. Chris Bowden talked about Global scenario of new threats and the overall scenario for vultures globally. In his plenary talk, he pointed out the emerging trends of vulture threats in Africa and Europe where these are quite different from South Asia. The most widespread threats are unintentional poisoning through poison baits and electrocution and collisions. Elsewhere, illegal killing for belief-based use, or by elephant poachers in Africa are significant. In other areas, food shortage and nesting habitat loss are problems. He explained that diclofenac and other NSAIDs remain the major threat and cause of the most dramatic declines across South Asia and how this is still the case today.

In his talk he has mentioned the important step-the ban of veterinary diclofenac by the Government of India (also quickly followed by Nepal, Pakistan, and Bangladesh) but how illegal use of human formulations means this threat has not gone away. The introduction of meloxicam as an alternative safe drug in veterinary practice has been crucial to reducing diclofenac use by vets. The establishment of vulture captive breeding centers by the Bombay Natural History Society (BNHS) in India, as an emergency measure has been an important safety net and in Nepal where diclofenac use is less, the first releases have already taken place.

He stressed on the Vulture Safe Zone initiatives which is a concept to focus awareness and activities in a 100 km radius around existing vulture colonies, with a team including the coordinator, biologist and community mobilizer and how testing of cattle carcasses for NSAIDs and pharmacy surveys are key actions. Finally he stressed that human diclofenac formulations are still being illegally used by vets (especially in large vials) and other NSAIDs such as nimesulide, ketoprofen, aceclofenac and other untested NSAIDs are available in veterinary usage which is still harmful to vultures. He further added that although multi-dose (large) vials of diclofenac have been banned by the Indian Ministry of Health on July 2015, still some vets and quacks will illegally use the drug.

After his presentation, Mr. Kalanithi, IFS., District Forest Officer, Nilgiri North Forest Division asked some questions. One about criteria for the declaration of vulture safe zone in the Nilgiris, and another question was on the status of usage of diclofenac before 1990s and finally he asked about supplementary feed to vultures. Mr. Chris answered that based on experiment one can think on providing supplementary food to vultures, but that the evidence of food shortage is not clear or scientifically shown. Dr. Baranidharan, Assistant Professor, Forest College & Research Institute, Mettupalayam asked about case studies and success rate of releasing vultures from captive breeding. Mr. Chris explained quoting couple of case studies done by Gujarat Zoo Conservation Breeding Program and Bulgaria. And the end he concluded by addressing some of the key points such as declining but stabilising vulture numbers at very low levels (after 99% declines), that releases of captive birds can only be done once usage of diclofenac and other NSAIDs is reduced close to zero, and demonstrated through testing for other NSAIDs in pharmacies and in dead cattle. This needs engagement of state Governments, local NGOs, Pharmaceutical industries & individuals, and monitoring local medical shops and systematic analysis of dead vultures and livestock throughout India.

Status and conservation of White-rumped vulture in India – An Overview -

By **Robert B Grubh,**
2nd Main Road, Christopher Nagar Extn., Nagercoil,
Tamil Nadu

Dr. Grubh the first Ph.D holder on vulture studies in India stated that the White-rumped Vulture (*Gyps bengalensis*) was the most common species in the Indo-Gangetic plains until about a decade before close of the 20th century. This vulture was also commonly seen at carcasses all over Peninsular India right down to Kanniyakumari District. However, the vulture population in the Southern India, particularly Kanniyakumari district where the author grew up, showed noticeable decline after mid-20th century. Dr Grubh found the reason for declining vulture population from his own district was mainly due to degradation and destruction of natural forest or conversion of the natural forest into commercial plantations has resulted in depletion of large wild herbivores, hence a reduction in the food source for *Gyps* vultures. Traditionally, the farmers raised cattle for milk, organic manure and for manual labour such as pulling carts, drawing irrigation water, and plowing. However, with the introduction of mechanized ploughing, motorized pumps and chemical fertilizers, farmers depended less on cattle for agriculture, resulting in decline of village cattle. The author further quoted that due to introduction of high-yielding dairy cattle, they had access to modern veterinary medical aid, which minimized death of cows through diseases. Further, most of these animals did not get to die of old age because they were sent for slaughter house when they became economically nonviable. Thus, the sustenance of vultures was highly affected, resulting in their population decline. White-rumped vultures became extremely rare in Kanniyakumari district and the surroundings, decades before diclofenac (a new non-steroid anti-inflammatory drug, which was widely used by veterinarians).

Dr. Grubh shared his experience in those days of the vulture population scenario especially in Indo-Gangetic plains, where cows are generally not slaughtered for meat. Even while the vulture population was dwindling in the southern states, vultures flourished here. The numbers increased to such an extent that it was not uncommon to view as many as 3000+ white-rumped vultures at a single site in Delhi during the eighties of the 20th century. Many people used to send their cows or oxen from gaushalas (cow shelters) or even released them in the streets where they eventually died, thus making available a steady supply of food for vultures (pers. obs.). Vultures have a habit of taking advantage of thermals to soar in the sky for their various survival needs. Usually they used to soar in dense spirals between 11 and 12 hours in order to gain height and then drift off to various locations of their choice (Grubh, R.B. 1980). He added that it was the usual time of day when aircraft encountered with vultures, especially during critical aircraft flight phases such as initial climb and final approach. As a result, the white-rumped vulture and even the Indian vulture (*G. indicus*) became major potential problematic birds for civil and military aircraft in India. While commercial airlines suffered huge financial losses due to engine damage and delayed flights, the Indian Air Force lost many fighter planes and, more importantly, valuable fighter pilots at the peak of their career. Considering this bird-strike hazard potential of vultures, recommendations were made (Grubh, RB. 1990) for ecological control of these birds by setting up modern abattoirs and modern carcass processing plants at key locations throughout the country. These recommendations were brought later on to the attention of members of a bird hazard prevention meeting specially convened in Delhi by the Scientific Advisor to the Minister of Defense in the year 1996. This committee unanimously accepted these recommendations for implementation with a sense of urgency. A speculation was floated by some researchers that some unknown virus or another disease factor was possibly the cause of vulture decline (Risebrough, Robert W. 2000). Later, this speculation was replaced by a hypothesis that diclofenac, introduced in India around the same time was the cause of vulture population decline in the neighboring country Pakistan (Oaks et al. 2004). Soon a simulation model was developed by Green, Rhys E. (2004) based on some data and several assumptions that even if only 1% of carcasses were contaminated by diclofenac, the Indian *Gyps* vulture populations would fall drastically. A welcome outcome of this hypothesis, however, was the banning of this harmful drug in India in the year 2006 for veterinary use.

Status of vultures in Kerala-

By **Sashikumar, C,**
Malabar Natural History Society, 9 Subhash Nagar,
Kannur 670002, Kerala

Mr. Sashikumar in his introductory talk described about ornithological literatures regarding Kerala since the beginning of 20th century. He told that four species of vultures occurred in Kerala namely Red-headed Vulture *Sarcogyps calvus,* Indian (Long-billed) Vulture *Gyps indicus,* White-rumped (Oriental White-backed) Vulture *Gyps bengalensis* and Egyptian Vulture *Neophron percnopterus.* Sightings of all species of vultures became increasingly rare from late 1960s onwards and they became virtually extinct in most parts of the state by late 1970s. He has pointed out that the causes of vulture decline in Kerala due to change in habitat, livestock management, socio-cultural attitudes, use of pesticides and direct poisoning, increase in human population density and awareness of social hygiene and changes in food habits and social taboos. He has stated that vulture monitoring was begun in the year of 2003 at least visited once in a month in Wayanaad Wildlife Sanctuary (WLS). The vultures were counted while travelling within the sanctuary through forest roads for a distance of about 30 km. soaring vultures were observed from vantage points mostly the *vayals* (open grassy marshes) in the PA. An average of 15 White-rumped and 2 to 4 Red-headed vultures were seen. At the end of his presentation he talked about synchronized survey which was conducted in the sanctuary in December 2013 and counted **35** White-rumped, **5** Red-headed and **2** Indian vultures. At the carcasses, congregation of vultures numbering more than 50 had been seen on some occasions.

Mr. Sashikumar said that the White-rumped vultures had a good rate of breeding success, at an average of 65% in Wayanad WLS. His team conducted NSAIDs prevalence surveys in drug stores of Wayanad district in 2008, 2011 and 2013 and found that there were about 13 brands of NSAIDs offered for sale. He has stated that the diclofenac in large pack (30 ml) was available in in at least one drug store in the year 2013. Other drugs which are harmful to vultures e.g. aceclofenac, ketoprofen, nimesulide etc. were also available. Hence it is inferred that the threat of NSAIDs harmful to vulture population still persists. The summary of his presentation showed that the small population of two species of vultures has been more or less stable for the last 15 years and all-time low number of nests was recorded. Management practices, especially the *vayal* management should be continued in the sanctuary. The prevalence of diclofenac and other NSAIDs should be strictly monitored and availability of NSAIDs should be totally eliminated in Kerala, especially in Wayanad and the neighboring districts by the Drug Controller. At the end he concluded that monitoring of carcasses should be continued till a substantial data is generated for proper assessment and a joint action plan has to be designed with Bandipur National Park, Rajiv Gandhi National Park (Nagarhole) of Karnataka and Mudumalai Tiger Reserve of Tamil Nadu so as to make effective conservation strategy.

Mr. Sashikumar informed that Teak and Rose wood are the preferred trees for nest construction and that coordination with neighboring states is not up to the mark and that there are human disturbances if nests are located very close to human habitations. Then Mr. N. Mohanraj, Honorary Wildlife Warden, Mudumalai Tiger Reserve asked about the impact of the forest cover on vulture population between Wayanad and Bandipur and the impact on *Lantana* cover proliferation on vulture population. Mr Sashikumar replied yes there is an impact of *Lantana* cover, but it required a detailed study to comment on it. Dr. Christopher from Mahathma Gandhi University, Kottayam supplemented that forest fire play vital role on forest dynamics, but still it requires long term study to bring out conclusion.

Population estimation of vultures in Moyar Valley: Sweep surveys -

By **Mr. Chandrasekaran, S.,**
Freelancer, Chennai

Mr. Chandrasekaran presented his sweep survey findings. He mentioned that his sweep surveys were carried out by adopting standard protocols as suggested by Gary M. Fellers and Kathleen L. Freel by modifying a bit to suit area of his study, that is, Moyar Valley. Ideally this survey brings to light that experts who have extensive experience in species identification and the capacity to walk in remote forest areas can to a large extent assess the population since they occupy known niches in this vast terrain and a complete survey includes all habitats and terrain fully covered within the survey period so that vulture niches and numbers may be identified with fair accuracy. He stated that some of the biologists believe that individuals routinely move from one population to another and without this dispersal, the populations may not be self-sustaining over a period

of time. He added that this method has many advantages over other techniques, because there is no bias in selecting sites and no need to extrapolate the data. At the same time, he opined that this method also has some disadvantages such as time required, man power and cost. In a large park or wilderness, it may be a deterrent unless suitable modifications are adopted. He finally concluded that there is a stable population for the last three years as the figures indicate. Giving allowance to observer bias and repetitions (that was restricted to only few camps), the population may well be around 150+ for all the four species. The Egyptian vulture is pretty rare to find in this landscape as per the results of the surveys. After his presentation, Dr. Baranidharan, Assistant Professor, Forest College & Research Institute, Mettupalayam asked that how the complete count avoided duplication. Mr Chandrasekaran replied that all sightings would have time, numbers, species name along with direction. The teams operate in a synchronized pattern, that is, operate at different camps placed equidistant in the landscape at the same time and day. When results are plotted in a map of the area, one can see the movement of birds versus time and day and can easily find overlapping territories or adjacent camps in order to avoid duplication. Fortunately, only 2 camps out of 12 indicated the possibility of overlapping.

Population estimation of vultures in Moyar Valley, Tamil Nadu: Road transect survey -

By **Dr. Venkitachalam, R. ATREE,**
Bangalore

Dr. Venkitachalam has mentioned that although nine species of vultures are recorded in Indian sub-continent, six vulture species were found in the Moyar Valley of Tamil Nadu namely, Oriental White-rumped (OWRV), Long Billed Vulture (LBV), Red-Headed Vulture (RHV), Egyptian Vulture (EV), Himalayan Griffon and Cinereous Vulture. He stressed that the Oriental White-rumped and Indian Vultures have an active nesting population in the landscape. Record of few RHV juvenile vultures in the landscape indicates that RHV also breeds in the landscape. He also quoted sightings of two migratory vultures namely Himalayan Griffon and Cinereous Vulture in the landscape as well as in the adjoining states of Kerala and Karnataka. Dr.Venkitachalam had applied road transect count driven by a four wheeler on tarred road, sand and metal roads. He says that the flock size of the OWRV was significantly higher and the LBV was very low and there was no difference in RHV. Dr. Venkitachalam also stated that there is no seasonal variation noticed in Red-headed Vulture and Long Billed Vulture across the season. However he found that there was a seasonal variation in population and encounter rate in OWRV. He stressed on the need of government and non-governmental organizations involvement to save last surviving small population of vultures through research, advocacy and awareness. He opined that the recent mortality of vultures in the landscape is another challenge for conservationists. Finally he concluded on the need of long term ecology studies such as (nest monitoring, NSAID survey & transect survey) advocacy and conservation awareness for announcing this landscape as a permanent safe zone for vultures. After the presentation the forum suggested that they should come up with a uniform methodology especially for population estimation. Some of them were suggested that combine methodology might be a good option for entire landscape. Finally the forum suggested to undertake synchronized population estimation within the landscape to get accurate number of vultures.

Conservation strategies for securing Critically Endangered White-Rumped (*Gyps bengalensis)* and Long Billed (*Gyps indicus)* vulture species in the Tamil Nadu part of the Nilgiri Biosphere Reserve-

Dr. B. Ramakrishnan,
Assistant Professor in Wildlife Biology & Organizing Secretary of the “Securing Vulture Population in Southern India” workshop, Udhagamandalam

Dr. B. Ramakrishnan and his team made a study on vulture population in Mudumalai and Sathyamangalam Tiger Reserve and Nilgiri North Forest Division for two years from 2015 to 2016. Population estimation was done by nest site count method, breeding ecology (was studied by direct field observation) diclofenac and other threats assessed by questionnaire survey. Ramakrishnan said that his team has identified a total of seven nesting and one roosting locations used by two vulture species, of which belonged to four White-rumped and three Long-billed vultures. A total of nine villages

are there in and around the nesting and roosting colonies. A total of 52 White-rumped vulture nests were recorded in 38 nesting trees. Jagalikadu nesting colony had recorded 28 nests in 21 trees. Two tree species namely *Terminalia arjuna* (37 trees with 51 nests) and *Spondias mangifera* (one tree with one nest) were used for nest construction. Among the 52 White-rumped vulture nests, 40 nests were observed as active nests evidenced by frequent usage of a nesting pair. Out of 40 incubations, 24 hatchlings came out with the 58% of the breeding success in all four nesting colonies altogether. On the other hand, 100% (n=2) fledge out was recorded from 2 incubations of a Long-billed vulture. He has concluded the need for long-term monitoring of vultures in order to find out the reasons behind for breeding success and failures of White-rumped vultures in the landscape and study on food availability, population viability, etc.

Dr. B. Ramakrishnan and his team presented their drug store survey. The result revealed that a total of ten diclofenac composition painkillers are being currently prescribed by the doctors for human use. An alarming message is that 30 ml vials are still available in the drug stores. He stated that they have recorded a total of forty-two White-rumped vulture deaths between 2013 and 2016. Of which thirty-four individuals were adult and eight were immature. The post-mortem was conducted only for eight of them other 32 individuals were seen with skeletal and feather remains unable to conduct post-mortem. The autopsy laboratory result revealed that the tissues of the vultures were contaminated by ***Organo phosphorus and urea*** which is a poison used as an insecticide in agriculture practice and one died due to its neck lock between the vertebral bones of the domestic buffalo carcass while feeding. He concluded that retaliatory killing is effectively influencing on vulture population than Diclofenac.

After his presentation Dr. N. Sivaganesan, Freelancer from Mayiladuthurai asked why vulture sightings were more in thorn forests?. In reply Dr. Ramakrishnan responded that due to open area and easy visibility in thorn forests, the vultures were able to sight carcasses apart from this it would be easier for them land easily and takeoff than other dense forest types. Presence of perennial water source is also another important for the use of thorn forest (Moyar Valley). Then Mr. Rajkumar from Wildlife Conservation Foundation, Mysore supplemented that he also sighted is more number of vultures in thorn forests than in other forests in Bandipur Tiger Reserve, which is an adjoining landscape. Mr. S. Paulraj, IFS (Retd.) Chennai, clarified and supplemented the persistence of deliberate poisoning of carcasses even during his tenure as a wildlife warden in the Mudumalai Wildlife Sanctuary during 1995-2000. Mr. K. Kalidasan, President of OSAI Environmental Organization, Coimbatore question on the reason for declining vulture population in Siriyur nesting colony. Mr. Bharathidasan from Arulagam asked about correlation between mortality of vultures and striped hyenas the striped hyena is also one of the most important species seen in the landscape which has drastically reduced?. Dr. Ramakrishnan replied that 2 cases of hyena deaths were recorded in 1990 and 2000. Mr Bharathidasan asked about what are the alternatives to work against poisoning. Dr. Vijayaragavan, Forest Assistant veterinary Surgeon supplemented his experience by evidencing poisoning incidents through his 3 to 4 post mortem examinations. Finally he concluded that poisoning was the most threatening culprit followed by Diclofenac and other NSAIDs, pilgrims, honey collectors and fire, etc. for vultures in and around the Nilgiris Landscape.

Status of vultures in Bandipur Tiger Reserve, Karnataka-

By **Mr. Rajkumar, D.,**
Wildlife Conservation Foundation (WCF), Mysore

Mr. Rajkumar, WCF, Mysore presented vulture status in Bandipur Tiger Reserve (BTR). He applied search method from 2003 to 2016. He has compared his data which were collected earlier in 2002-2003, when 17 sites were surveyed for one year in four phases in BNP and *Gyps* vulture species in 12 sites. He presented compilation of all sightings, including breeding sites. He had recorded around 125 birds in 2003. On the contrary, he has sighted just 7 birds in 2007, followed by 60 birds in 2008 and 479 birds in 2010. In 2012 he had sighted 169 birds, in 2013 a total of 311 birds were seen by him. At last he has sighted 251 birds in 2016. He has recorded one breeding site of Long billed vulture at cliff in Byladakuppe in Moyar range then it was disturbed by labours who worked on the construction of road and fire watch tower. Rampura bordering Waynaad Wildlife Sanctuary had 3 breeding trees and Banoor had 2 breeding trees that are still habited by vultures. Kabini River and Nugu River back waters are the major feeding sites to vultures where elephants congregate during peak summer. Cattle and livestock death along border villages make another good but vulnerable feeding sites to vultures. He quoted that Diclofenac and other NSAIDs were easily available in Gundlupet town, Chamarajanagar district, H.D. Kote with veterinary attendees in villages surrounding BTR. He conducted many awareness programmes in schools, colleges and surrounding villages of BTR and circulated save vulture pamphlets in local language. Apart from this a bike rally was conducted by him with the help of Arulagam

in Gundlupet which was also supported by the Karnataka Forest Department.

After his presentation, Dr. Sivaganesan supplemented that he found elephant carcasses only by looking the vultures' soaring in the sky during 1985-1990s, when elephant poaching was at peak. Mr. Sashikumar from MNHS, Kerala said that the overall numbers presented by Mr. Rajkumar was seemed to be a very high numbers especially, white rumped vultures and he asked why the reason for Red headed vultures were seen just one or two in BTR at the end he asked why there is a lacking of publications on vultures in Karnataka, though the state has declared first vulture sanctuary in the country. Mr Rajkumar replied that the high number of vultures sighted mainly during elephant migration periods. He also stressed that may be a synchronized vulture population count by three states might give more accurate picture rather than what we are doing in their respective states. Mr. Chris Bowden added that ecology of Red headed vulture might not be the same then as for White rumped vulture. Mr. Rajkumar responded that keeping cameras near to carcasses of tiger kill or elephant deaths would give more realistic pictures of various vulture species. At last Dr. Robert B. Grub, the first vulture Ph.D holder in the country asked when there was any competition between vultures and tigers since tigers might hide their prey remains which might not be accessible to vultures. Mr Rajkumar responded that there is a competition between vultures and tigers, but he has not recorded any event. To another question Mr Rajkumar answered that the tiger drag the prey remains. But in during summer it would be more open in Kabini back water. Hence it is easily accessible for the vultures to identify the carcasses.

Population, breeding ecology and conservation threats of Long Billed Vultures (*Gyps indicus*) in the Ramadevarabetta Vulture Sanctuary (RVS) in Ramanagaram Hills, Karnataka.-

By **Mrs. Padma Ashok,** Save Tiger First, Bangalore

Mrs. Padma presented on the status of Long-billed vultures in the Ramanagara hills. She described that the Ramanagara hill as the world's oldest granite outcrops and is also known as South India's earliest rock climbing hub. She told that apart from its geological importance, Ramanagara is the home for the country's first vulture sanctuary called the *Ramadevarabetta Vulture Sanctuary*. The hills at Ramanagara are one of the few locations in the land of South India where Long-billed Vulture (LBV) constructs nest was today. She said that with an effort to conserve the tiny population in the Ramanagara, a study was conducted in 2005 by a team of bird watchers led by Dr. S. Subramanya,

Ornithologist. Based on the findings of this small study about 346.14 hectares was declared as Ramadevarabetta Vulture Sanctuary on 31st January 2012 by the Government of Karnataka. As a recent update there were about 15-20 Long-billed Vultures in 2010-11. The study initiated by Save Tiger First commissioned by Karnataka Forest Department was a continuation to the study conducted in 2005. Aim of the study was to assess palatable habitats to Long-billed Vulture (*Gyps indicus*), to estimate their present population and monitor them. She told that there were about 4-5 LBVs which currently roosted on the cliffs of Ramadevarabetta hill. Occasionally there were 7 LBVs seen. She pointed out the movement of local people and tourists as pilgrims as well as rock climbing are mainly attraction of the Ramadevarabetta hill. Awareness creation was given to the school children and diclofenac survey was conducted in drug stores. She concluded that there is a disappearance of LBVs from other bettas (hills) which are surrounded nearby mainly due to human disturbances. After her presentation the forum asked many questions such as breeding status, sex ratio, nest status and validation of the methodology and so on. She answered that presently she had observed just 2 male and 1 female and there was about 14 individuals when it was declared as a sanctuary. The methodology is not validated because she did not publish her findings so far. Finally the forum suggested instead of just doing observation some standard methodology can be followed in future for the betterment of this vulture population.

Status of vultures in Telangana and Andhra Pradesh-

Shaik Hussain,
Laboratory for the Conservation of Endangered Species, CCMB, Attapur, Hydrebad-500 048.

Mr. Shaik Hussain from Hydrebad presented on vultures in Telangana and Andhra Pradesh. He told that three vulture species were found in Telangana and Andhra Pradesh namely, Oriental white-rumped, Indian long-billed and Egyptian Vultures. His team surveyed vultures across Telangana and Andhra Pradesh, from September to October 2017. Road transect method was applied mostly on state highways and on roads running through protected areas. Breeding colony of Indian long-billed vulture was situated on the southern face of 80-90 meter high elevated rock cliff (108 meter total height of the cliff), named **"**Palarapu cliff", in the Bejjur Reserved Forest near Nandigaon village at the confluence of Peddavaagu stream and Pranahita river. Two *Gyps* species have been reported by his team in three locations from Andhra Pradesh *i.e*. Indian long-billed Vulture (Srihari kota, n=2 and Domalapenta- Srisailam Tiger Reserve, n=1) and Oriental white-rumped Vulture (Mamandur-Thirupathi, n=1). He added that in the initial stage of the project named "Conservation of Indian long-billed Vulture" by Telangana Forest Department at Palarapu cliff, there were only 9 individuals, now this population has grown up to 26 individuals in 2015, 30 individuals in 2016 and 32 individuals in 2017. He mentioned that Egyptian Vultures were recorded from Kesrera gutta-Municipal yard (n=6), Rajendra Nagar (n=3), Ameenpur Lake (n=4) and Bejjur Reserved Forest (n=1). He concluded his presentation by quoting major threats on the vulture populations in Telangana and Andhra Pradesh are diclofenac, food scarcity both natural and artificial, competition for food from other scavengers, cyclones especially in coastal areas, habitat destruction especially in nesting sites, human movement, malaria and other diseases. After his presentation, the forum asked about the possibility of captive breeding of Long-billed vultures, what kind of malaria was recorded, invitro or insemination programme and any gastro intestinal parasitic study was found in the population. Mr. Hussain responded that they observed plasmodium which caused malarial infestation. Due to difficulty in dropping sample collection there would be less chance to carryout gastro intestinal parasitic study in birds. He finally he opined that the need for long term scientific study for invitro or insemination programmes in birds especially critically endangered vultures like Long-billed vultures should be done as their numbers are very low.

TECHNICAL SESSION - II
CONSERVATION THREATS

Diffuse pollutants other than NSAIDS – Any potential concern for vultures in India-

Dr.S. Muralidharan,
Principle Senior Scientist, SACON, Coimbatore

Dr. Muralidharan from SACON presented on diffuse pollutants other than NSAIDs role on death of vultures in India. He mentioned that though the diclofenac was a major culprit for decline in vulture populations across the south Asian countries there were also incidents of others contributing to the decline of vulture population. But incidentally or unfortunately he was unable to have adequate samples to his laboratory to identify what chemical was responsible for it. But through recently published papers, they have compiled information of around 50 vulture samples altogether from Tamil Nadu, Gujarat and Assam between 2013 and 2015. This was not even 1/100th of actual mortality. He also added that the sample from Mudumali Tiger Reserve also had residues of diclofenac, but it was not adequate enough to be called as toxic but otherwise it was exposed. He stressed the role of diclofenac cannot be ruled out. At the same time circumstantial evidence also suggests on other contaminants also could cause more problems. He added that so far about 90 individual samples came to his lab between 1999 and 2015. Between 2015 and 2017 alone they had received around 68 bird samples along with liver, kidney, muscle, gut content, undigested food materials, blood samples and couple of eggs also. They tested these samples for organochlorine pesticide, polychlorinated biphenyls, polycyclic aromatic hydrocarbons and heavy metals like Pb, cadmium, Cu, Cr and so on. At the end he stated that Organochlorine, DDT and banned Endosulfan also found in the autopsy of vulture tissues. After his presentation the forum asked many interesting questions like, what is the lethal level of diclofenac contamination would kill vultures, Symptoms of diclofenac caused deaths and which part of the livestock carcass is more susceptible part if the vultures feed. He replied by quoting Newton's paper for lethal level of diclofenac in the carcass and symptoms of diclofenac caused deaths. Finally he concluded that muscle eating vultures might consume more diclofenac or other NSAIDs and thus resulted in high probability of mortalities because liver and kidney of livestock could have excreted or metabolized the effects of NSAIDs than muscle.

Impact of Diclofenac, other NSAIDS and indirect poisoning on vultures -

By **Dr. N. S. Manoharan,**
Forest Veterinary officer, Coimbatore Circle, Coimbatore

Dr. Manoharan stressed on the impact and symptoms of all NSAIDs on veterinary aspects and shared his experience on deliberate poisoning reasoned behind for deaths of various carnivores such as tiger, leopard, hyaena, wild dog, wild pig and including vultures in the Nilgiris and surrounding areas. He compared between vulture and tiger populations co-existence in the way back 1980s when it was drop down and recovered back since 2005 in the Nilgiris.

Vultures and NSAID'S -

By **Dr. Percy E. Avari,**
Assistant Professor, Department of Poultry Science,
Bombay Veterinary College

Dr. Avari explained in detail on the effect of NSAIDs like diclofenac and others on the physiology of vultures. He dealt in detail on the symptoms shown in vultures by these NSAIDs physically, physiologically and veterinary perspectives. He also elaborately discussed the inadequacies in handling NSAIDs like Diclofenac, Accelofenac, Nimesulide etc. and the least affecting drugs like Aspirin, Melaxicam, Paracetamol etc. He emphasized the need to test new NSAIDs on the toxicity level so that the remnant vulture population is not affected. He insisted that Veterinary practitioners should educate farmers about the role of these toxic NSAIDs so that misuse is restricted. After his presentation long discussion took place on the symptoms of NSAIDs and his experience in vulture post mortem analysis and whether only diclofenac is the cause of decline, in which many of the veterinary doctors participated enthusiastically.

Use of Diclofenac and other NSAIDs in rural veterinary practice -

By **Dr. *Shanmugasundaram, S.***
Forest Veterinary Officer (Retd.)

Dr. Shanmugasundaram told that he never used diclofenac as anti inflammatory drug in his veterinary practice (At presently he is practicing in rural areas near to vulture habitats). At the same time he also stated that the Government of Tamil Nadu provides adequate vulture safe drug named Melaxicum as an alternative to diclofenac. But continuous vigil is required especially in the vulture surrounding areas in order curtail diclofenac usage as well as impact on other NSAIDs to rural veterinary doctors may be through Government or organizing separate workshops for rural veterinary doctors would be much better for the long run conservation of vultures in future.

Post mortem analysis of White-rumped vulture in Mudumalai Tiger Reserve -

Dr. Vijayaraghavan, E.
Forest Assistant Veterinary Surgeon,
Mudumalai Tiger Reserve.

Dr Vijayaragavan in his introductory speech emphasized on the importance of postmortem examination for all wild animals. Dr. Vijayaragavan shared one of his experiences of vulture postmortem which happened during 2015 year. On that occasion about four White rumped vultures were brought to his dispensary. Among the four individuals, two of them were already dead and two in dying condition. He provided saline water and peak of sublimate. After one hour both died. He found vomiting was the major symptom that he observed from the two vultures before they died. When he conducted the post mortem, he found meat material in the crop. He also found other organs normal and saw ammonia and urea in the intestine. At last he found calcareous

symptoms and blood in mouth and anus. Thereby he had suspected that the cause of death of the four vultures was due to poisoning. After the post mortem blood samples and required internal organs were sent to two laboratories namely SACON and Regional Forensic Science Laboratory, Coimbatore for further lab analysis. After 5 days the field staff found another the vulture dead near a buffalo carcass which has got trapped its neck between vertebral bones of the buffalo when it was feeding. Dr. Vijayaragavan told he has received astonished message was that there were two totally different lab analysis reports from two institutions. The SACON has submitted the four vulture death was caused due to diclofenac effect and another Regional Forensic Science Laboratory, Coimbatore report stated that it was due to poisoning by ***Organophosphorus and urea.*** After his presentation the forum asked that how come two different results which were totally deviated for same samples. The forum also asked that the poisoning is an accurate and diclofenac effect is chronic, so how come two institutions could provide two different results. This presentation really opened an eye on lab results and its reliability. At the end, the forum suggested to send the samples to at least three labs considering the importance of critically endangered species like vultures in future.

The prevalence survey on Non Steroidal Anti-Inflammatory Drugs (NSAIDs) in The Nilgiris, Tamil Nadu-
By **Mr. Manigandan,**
S. Biologist, Arulagam, Udhagamandalam

Mr Manigandan a researcher working with Arulagam made a survey from 107 medical shops in 18 locations on prevalence of NSAIDs in and around the Nilgiris. He told that out of 107 medical shops, 19 medical shops sold medicines for veterinary purpose. He found that all medical shops were very much aware on the ban of diclofenac. He added that 30 ml diclofenac vials were very much available in all medical shops for human purpose. During his survey he also found that other NSAIDs such as ketoprofen, acelofenac, flunixin and nimesulide were available and the shop keepers were not aware of harmful nature of them on vultures. Recent ban on ketoprofen was known by just eight medical shop keepers. He stressed on the need of awareness creation programmes to medical shop keepers especially who sells veterinary medicines.

TECHNICAL SESSION - III
AWARENESS PROGRAMMES

Maligned Hero-Birds: Importance of conservation awareness programmes on vulture conservation -

Daniel, B.A,
Scientist, Zoo Outreach Organization, Coimbatore

Dr Daniel from Zoo Outreach Organization delivered a speech on the importance of awareness programmes for vulture conservation. During 1999 on behalf of Zoo Outreach Organization Dr. Daniel, Mr. Marimuthu and his team conducted a study on status and management of vultures in Indian zoological gardens. Subsequently utilizing the data collected from Indian zoological gardens, developed user friendly educational materials for target groups. In 2012 all vulture education materials were revised and utilized by a range of wildlife and environmental educationists across India and South Asian countries. He told that this kind of awareness programmes created measurable impact on vulture conservation. The awareness programmes contain principle, approach, contents, practical education tools, feedback from the participants and discussed future management recommendations in selected places in India and south Asian countries.

Vulture conservation activities done By Arulagam from 2012 to 2017-

By **Bharathidasan, S., Arulagam,**
Coimbatore

Mr. Bharathidasan from Arulagam presented on efforts made by his team on vulture conservation covering four districts in Tamil Nadu state. Mr. Bharathidasan told that he and his team organized various programmes such as street theatre, puppet show, rally, human chain, exhibition, survey, sports event, carnivals, advocacy meetings to change the policy for sensitizing various stakeholders in and around vulture surrounding areas during 2013. In his presentation he stated that such programmes resulted in the withdrawal of ketoprofen, increased frequent raids by drug control officers, resolution passed in gramasabha, withdrawal of stay order against pharmaceutical companies on diclofenac by the Honorable Madras High Court. Finally he concluded that although various naturalists and scientists all over the world did their best efforts by taking timely interventions for recovering vulture populations, the Arulagam also did its level best for the state of Tamil Nadu.

People's perception on vulture conservation in Tamil Nadu part of the Nilgiri Biosphere Reserve, Southern India -

By **Samson, A, Ph.D**
Research Scholar, Government Arts College,
Udhagamandalam

Mr. Samson, A from the Government Arts College Udhagamandalam stressed on people's attitudes that play vital role for survival of vultures as it has multiple linkages and provides both positive and negative impacts on them. He interviewed totally three hundred and ninety one livestock holders from twenty six hamlets. Of which most of them were tribals (Irrular) and illiterate. A total of 8531 livestock were recorded by his door to door survey. Of which cattle were dominant (n=3621). He found that the livestock holders were making money mainly from dung (Rs.35,12,000/ annum). He also stated that a total of 8191 livestock were lost by 391 people during the past five years. Of which, most of them (n=5631) were lost due to various diseases and considerable (n=2548) number of livestock were lost due to wild carnivore's depredation. Mr. Samson quoted that the need of some long term mechanism to make sure food security to vultures as most of the (n=217) livestock owners just thrown away their livestock carcasses into forest areas and considerable (n=174) number of people buried their dead livestock carcasses. Sizeable number (n=137) of people known about diclofenac and its effects on vultures, at the same time most of them (n=254) were not aware of diclofenac and its related issues on vultures. His interview stated that the vulture population is declining (n=313), feral dog's population is increasing and compensation paid by the forest department for livestock loss due to wild carnivore's depredation is inadequate (n=388) and long procedures to be followed by the livestock keepers. At the end of his talk, he stressed on the need of adequate and timely compensation/ exgratia to the livestock holders in order to curtail deliberate poisoning of carcasses as retaliatory killing which is highly need of the hour to secure vulture population in the Nilgiris.

TECHNICAL SESSION - IV
MANAGEMENT IMPLICATIONS

Legal Battle to remove the stay on the ban of Multi Dose Vials (MDV) of Diclofenac -

By **Mr. Bharathidasan, S. Arulagam**

Mr. Bharathidasan talked about the legal battle faced by him for the ban of multi dose vials of diclofenac in the market. In his introductory speech he spoke about the Union government's decision to ban on multi-dose vials of diclofenac for veterinary use sparked hopes for the survival of the critically-endangered vulture species in India. He added that large multi-dose vials of 30 ml diclofenac labeled instruction mentioning '*Not for veterinary use*' is still available in the market, facilitating illegal use of the drug in veterinary practice, which may cause further decline in vulture populations. He mentioned that a big boost to vulture conservation was the recent notification passed by the Union Ministry of Health and Welfare on a total ban on multi-dose vials of diclofenac on July 17, 2015. The notification said that the diclofenac formulation for human use will henceforth be available only in single dose vials of 3ml. This ban was challenged by a pharmaceutical companies and stay was issued on 29th December, 2017 by the Madras High Court. It took 2 years to get a judgment from the Madras High Court. At the end, in October, 2017 the Madras High Court reinstated against pharmaceutical companies which has given hope of vulture conservation in southern India. The book released by Tamilnadu Forest Department in February 2016, authored by S.Chandrasekaran, Dr.N.Kalaivanan & Dr.B.Ramakrishnan formed the scientific base for the High Court to deliver this verdict.

GROUP DISCUSSION
GROUP-I
THEME: STANDARDIZING METHODOLOGY FOR VULTURE POPULATION ESTIMATION & RESEARCH ACTIVITIES

Name of the facilitator: **Dr. Robert B Grubh**

Name and Designation of the group members

Sl. No.	Name	Organization
1	Kiran Srivastava	RRCF, Mumbai
2	Rajkumar D	WCF, Mysore
3	Ravikanth M	Telangana Forest Department
4	Padma Ashok	Save Tiger First
5	Shaik Hussain	Conservationist & Wildlife Researcher
6	Dr. R Venkitachalam	ATREE, Bangalore
7	Vishnudas C K	Hume Centre for Ecology, Kerala
8	Mrs. Shailaja Grubh & Dr. Robert Grubh	Environmental Edu-Organization & Director, IRNE, Nagercoil
9	K Ranjith	Forestry Research Fellow
10	Dr. E Vijayaraghavan	Forest Assistant Veterinary Surgeon Tamil Nadu
11	Dr. Prayag H S	Sr. Ph.D. Researcher, KVAFSU-WII
12	Dr. Sujay C S	Wildlife Vet, Bannerghatta Zoo
13	Shashikumar B.	KVCT, Ramanagara
14	Dr. K Baranidharan	FCRI, Mettupalayam
15	Dr. S Paulraj	Trustee, CSPT, Chennai
16	R. Marimuthu	Zoo Outreach Organisation
17	A. Samson	Research Scholar, Govt. Arts College, Ooty
18	S .Saravanan	WWF, Nilgiris Western Ghats Landscape
19	D. S. Srinivas	Wildlife Conservation Foundation (WCF)
20	Dr. N S Manoharan	AA/FVO, Coimbatore

GROUP- II

THEME: CONSERVATION THREATS & MANAGEMENT IMPLICATIONS

Name of the group facilitator: **Mr. C.Shashikumar**

Name and Designation of the group members

S.No	Name	Designation
1	Mr. C.Shashikumar	MNHS, Kerala
2	Dr. Sivaganesan	Executive Director, Wildlife Environment Trust
3	Mr.Chris Bowden	RSPB and SAVE Programme Manager. Co-Chair IUCN Vulture Specialist Group
4	Mr.K.Kalidasan	President, OSAI, Coimbatore
5	Mr.S.Bharathidasan	Secretary, ARULAGAM, Coimbatore
6	Mr.S.Chandrasekar	Freelancer, Coimbatore
7	Mr.M.Rangasamy	Environment Science, Teacher , Riverside Public School
8	Mr.Jalaludin	NCS, Coimbatore
9	Dr.B.A.Daniel	Zoo Outreach Organization, Coimbatore
10	Dr.S.Shanmugasundaram	Forest Veterinary Officer (Rtd)
11	Mr.Sivasubramani	Senior Biologist, Tamil Nadu Forest Department
12	Mr.N.Mohanraj	Honorary Wildlife Warden, Mudumalai Tiger Reserve
13	Dr.P.Rajasekaran	Blue plant Trust, The Nilgiris
14	Dr.Percy Avari	Assistant Professor, Department of Poultry Science, Bombay Veterinary College.
15	Dr.Balamurugan	Assistant professor, Government Arts College, Udhagamandalam
16	Dr.Ronaldross	Assistant Professor , Department of Zoology Government Arts College, Ariyalur
17	Dr.Milton Prabu	Assistant Professor , Department of Zoology Annamalai University
18	Dr.Vijayaragavan	Forest Assistant Veterinary Surgeon, Mudumalai Tiger Reserve, Theppakadu, The Nilgiris
19	Mr.Samuel	WWF- India, Nilgiris Western Ghats Landscape
20	Dr.Sukumaran	Additional Director, Animal Husbandry
21	Mr.S.Manigandan	Biologist, ARULAGAM, Coimbatore

Group discussion by the experts to bring out feasible scientific management implications

Group - I

Group - II

CONSERVATION ACTION PLAN BROUGHT OUT FROM GROUP DISCUSSIONS FOR SECURING VULTURE POPULATION IN SOUTHERN INDIA

1. The workshop has formed "Vulture Conservation Working Group - South India" (VCWG-SI)" which is committed to protect the vultures in south India, and to advocate suitable conservation measures to protect their habitats in south India. VCWG-SI sincerely expresses its appreciation to

a. The Forest Department, Government of Tamil Nadu for its contribution for coordinating this workshop in Tamil Nadu, first of its kind .

b. The Secretary to Government & the Director, Animal Husbandry Department, Tamil Nadu for withdrawal of vulture harmful drug 'ketoprofen' from the Government dispensary.

c. Drug Control General of India for banning Multi Dose Vials (MDV) of diclofenac and records its gratitude to the Honorable High Court of Madras for upholding the ban of MDV of diclofenac.

d. Central Drugs Standard Control Organization and State Drug Control Department of Tamil Nadu for their support and also for conducting periodic raids in the pharmacies.

e. The Forest Departments of Kerala and Karnataka for faster compensation process to livestock holders for livestock kills by large carnivores and reducing the pressure of retaliatory poisoning.

The Workshop appealed and RESOLVES to

(2) The Secretary to Government & the Director, Animal Husbandry Department of Tamil Nadu, Kerala, Karnataka, Andhra Pradesh & Telangana

a. Not to procure Non-Steroidal Anti Inflammatory Drugs (NSAIDs) and other similar veterinary drugs that are harmful to the vultures such as Aceclofenac, Nimesulide and Ketoprofen for the Government dispensary and initiate necessary action for the immediate withdrawal of all harmful NSAIDs from all Government dispensaries. Instead to promote traditional remedies and medicines or known safe drugs such as meloxicam.

b. State Governments in South India to issue the appropriate Government order for testing of NSAIDs in dead cattle and vulture carcasses and sending the tissue samples to at least three, but not limiting to fully equipped laboratories such as Indian Veterinary Research Institute (IVRI), Sálim Ali Center for Ornithology (SACON), Advinus or Veterinary colleges in the respective States.

(3) This workshop highlighted poisoning of carcasses poses a grave threat to the vulture populations and appeals to the State Principal Secretary to Ministry of Environment & Forests, Principal Chief Conservator of Forests, Chief Wildlife Warden of respective State Forest Departments to initiate policy level decisions to immediately ease the compensation process in order to curtail the poisoning of cattle carcasses. Because of the understandably high profile concern for avoiding poisoning of large cats, and the measures already in place to tackle this issue, there is some very positive synergy here between these measures and those needed for vultures. Reinforcing these synergies as part of the vulture conservation action plan is urgently needed.

(4) Expresses its concern over the forest fires in and around vultures nesting colonies and appeals to the

State Forest Departments to take necessary fire protection measures to prevent such fires destroying vulture nests and its habitat especially during local temple festivals.

(5) Appeals State Governments in South India to appoint and train Vulture Watchers from the indigenous ethnic communities and initiate people's participatory approach for vulture conservation by also involving the conservation organisations and institutions, policy makers, NGO's and other interested individuals for promotion of 'Vulture Safe Zones' in South India.

(6) Highlights the need for a 'Vulture Conservation Action Plan' in their management plans of all forest divisions. Similarly, all 'Tiger Reserves' should also incorporate 'Vulture Conservation Action Plan' within their 'Tiger Conservation Plan', and that this may be readily available in regional languages as well.

(7) Requests that 'Vulture Research Centers' to be established and operated in all vulture ranging states by the Forest Department where a core team consisting of, but not limiting to, a veterinary doctor, wildlife biologists, research assistants and supporting field staff to monitor, document (and carry out necropsy, tissue analyses at accredited laboratories) on all the available carcasses of wild fauna including livestock and vultures as far as possible as well as liaisoning with forest department and livestock holders in order to curtail deliberate poisoning in livestock as retaliatory killing.

(8) Expresses its concern for biotic and abiotic disturbances to vulture nesting sites and in particular, the conduct of festivals in eco-sensitive zones of Siriyur, Jagalikadavu and Karuvannarayar Temple of Moyar region (of Nilgiri Biosphere Reserve) that are pose threats to vulture nesting sites and, appeals (a) to the Forest Department, Govt. of Tamil Nadu to initiate steps to control and implement suitable measures to reduce the impacts of pilgrims and/or tourists by coordinating with the District Administration and the Hindu Religious Endowment Board, Government of Tamil Nadu (b) to regulate tourism in the vultures nesting sites based on recommendations made in the Vulture Conservation Action Plan.

(9) Appeals to the Principal Secretary to the Ministry of Environment & Forests, PCCF, Chief Wildlife Warden of Forest Department of respective States to (a) amend and/or frame the rules not to bury or burn wild animal carcasses (if there is no evidence of poisoning and contamination) and to leave them for vultures and other wild scavengers as food (b) that if any wildlife carcass is found near human settlements, suitable arrangements made to shift the carcass to the forest areas and away from human habitation.

(10) Appeals to the respective State Forest Departments to (a) assess the impacts of windmills and power lines on the vultures and other related avifauna and take corrective measures (b) the Electricity Board to remove all overhead transmission lines or re-align power lines to avoid collision and electrocution of vultures (c) wherever possible, replace and install underground cables and wires and, (d) carry our Sensitivity mapping with respect to wind farms and transmission lines to the potential impact on vultures.

(11) Appeals to the District Administration, Forest Department and Public. Works Department of respective State Governments to provide adequate water and monitor the quality of water in the forest areas by joining hands with appropriate research institutions and Non-Governmental Organizations.

(12) Appeals to the District Administration, Animal Husbandry Department and Forest Department of respective States to take appropriate steps for the disposal of poultry waste which is likely to spread unknown pathogens and contaminants across the vulture landscape.

(13) The 'Blueprint for Vulture Conservation' be re-titled as draft of "Vulture Conservation Action Plan" and the same for each State be finalized as soon as possible.

(14) A uniform and coordinated methodology be adopted for surveys, studies on breeding biology and ecology of vultures for all landscapes.

(15) The workshop has selected the following state coordinators with respect to their states and one Coordinator for south India to take forward conservation initiatives for securing vulture populations in southern India

1. Dr B Ramakrishnan for Tamil Nadu
2. Mr. Rajkumar D for Karnataka
3. Mr. C Sashikumar for Kerala
4. Mr. M Ravikanth for Telangana
5. Mr. Shaik Hussain for Andhra Pradesh with
6. Mr. Bharathidasan S. of Arulagam as Overarching coordinator who is designated for closer co-operation and liaising with and between the State Forest Departments, Animal Husbandry departments, Drug Control authorities, conservation organisations and NGOs, etc.

(16) VCWG-SI appeals to the 'Chief Wildlife Warden', Government of Tamil Nadu for taking necessary steps for safe release the rescued Cinereous Vulture from Kanyakumari and attaching GPS – PTT tags for monitoring its migratory route.

(17) The VCWG-SI suggests the following step wise methodology for estimating vulture populations in all vulture ranges in south India

a) Secondary data collection

To get basic information about the presence and absence of vulture nesting, roosting, bathing and foraging sites in the focused study areas from local people, forest field staff, local NGOs, wildlife photographers, media personnel and old records (journals, personal communications) through Questionnaire Method.

b) Preliminary Survey

To get vulture's occurrence, distribution and confirmation of nesting, roosting and bathing sites in the focused study area

1. Road survey
2. Foot survey

c) Standard Methodology for population estimation

To estimate accurate population status of vultures in the focused study area

1. Nest site count
2. Roost site count
3. Carcass count

The following persons were identified to provide protocol for research activities to be taken up in their respective states

1. Dr. Prayag – Sexing of Birds in India & Post-mortem Studies, Collection, Preserving, Clinical Science and sending back the respective institutes, India
2. Dr. Bharanidharan (Forest College) – Ethology of Vultures, Tamil Nadu
3. Mr. Ravikanth – Breeding Biology – LBV, Telangana
4. Mr. A. Samson – Population Dynamics, Breeding Biology and Conservation Threats of Vultures in TN
5. Dr. Venkitachalam – Dispersal Patterns of Vultures, Breeding Biology & Diclofenac prevalence, Tamil Nadu
6. Mr. Vishnu Das – Population Genetics of Gyps vultures & Breeding Biology, Kerala
7. Miss. Padma – Study of Habitat & Diclofenac Prevalence at Ramanagara, Karnataka
8. Dr. N. S. Manoharan, Post-mortem Studies, Collection, Preserving, Clinical Science and sending back the reports to respective institutes, Tamil Nadu
9. Dr. Sujay, Bannerghatta Zoo, Post-mortem Studies, Collection, Preserving, Clinical Science and sending back the reports to respective institutes, Karnataka
10. Dr. Arun Satyaprakash - Post-mortem Studies, Collection, Preserving, Clinical Science and sending back the respective institutes, Andhra Pradesh
11. Dr. Praveen - Post-mortem Studies, Collection, Preserving, Clinical Science and sending back the respective institutes, Telangana
12. Mr. Sheik Hussain – Long-term Monitoring of Vultures – Status, Distribution, Abundance (Nesting, Roosting & Carcass Counts), Diclofenac Prevalence, Telangana & Andhra Pradesh
13. Mr. Sandeep Goud – Conservation Breeding Program, (ex-situ) Nehru Zoological Park, Hyderabad
14. Mr. Rajkumar D (WCF) – Monitoring of Vultures, Karnataka & Southern Flyways – Telemetry Studies (to be started)
15. Synchronized vulture survey, as a first phase in Tamilnadu, Kerala & Karnataka, lead by the respective state coordinators.

FIELD VISIT

On 10th early morning by 06.00 am interested persons were taken to one of the important vulture nesting colonies named as Jagalikadavu which is located in the Nilgiri North Forest Division. vultures. The group sighted two vultures resembling Griffon but later diagnosed as Immature Indian vultures. Working breakfast was provided in the field.

LIST OF ORAL AND POSTER PRESENTATIONS DELIVERED IN THE WORKSHOP

S.No	TECHNICAL SESSION – I STARTS	Status, survey and population estimation of vultures
1	Mr. Chris Bowden, Globally Threatened Species Officer & SAVE Programme Manager, UK Plenary Talk	The Current Threats and Status of Vultures in Asia
2	Toby Heath Galligan Senior Conservation Scientist, RSPB Centre for Conservation Science, The Lodge,Sandy, Bedfordshire.	The Good, The Bad And The Unknown: NSAIDs Available in Vulture-Range Countries
3	Dr. Robert B Grubh Scientist (Retd.), BNHS Nagercoil, Tamil Nadu	Status and conservation of White-rumped vulture in India – an overview.
4	Mr. C.Shashikumar and K. Vishnu Das Malabar Natural History Society, Kerala.	Status of Vultures in Kerala
5	Mr.S. Chandrasekar, Freelancer, Chennai	Population estimation of Vultures in Moyar Valley: Sweep surveys
6	Dr.R.Venkitachalam ,Ph.D ATREE,Bangalore	Population estimation of Vultures in Moyar Valley: Road side count
7	Mr. Rajkumar, Wildlife Conservation Trust, Mysore	Status of Vultures in Bandipur Tiger Reserve, Karnataka.
8	Mrs. Padma, Save Tiger First Foundation, Bangalore	Population, Breeding Ecology And Conservation Threats Of Long Billed Vultures (Gyps Indicus) In The Ramadevarabetta Vulture Sanctuary (RVS) In Ramanagaram Hills, Karnataka.
9	Mr. Sheik Hussain Free Lancer Andhra Pradesh	Status of Vultures in Andhra Pradesh and Telangana
10	Dr.B.Ramakrishnan,Ph.D Assistant Professor in Wildlife Biology Department of Zoology & Wildlife Biology, Govt. Arts College Udhagamandalam.	Conservation Strategies for Securing Critically Endangered White-Rumped (Gyps bengalensis) and Long Billed (Gyps indicus) vulture species in the Tamil Nadu part of the Nilgiri Biosphere Reserve
	LUNCH BREAK	
	TECHNICAL SESSION – II STARTS	**Conservation Threats**
11	Dr. S. Muralidharan, Principal Senior Scientist, SACON Coimbatore Plenary Talk	Diffuse Pollutants other than NSAIDS – Any Potential Concern for Vultures in India
12	Dr. N.S. Manoharan, M.V.Sc Forest Veterinary Surgeon Coimbatore	Impact of Diclofenac, other NSAIDS and Indirect Poisoning on Vultures

13	Percy E Avari Assistant Professor, Department of Poultry Science, Bombay Veterinary College.	Vultures and NSAID's
14	Dr.S. Shanmugasundaram, B.V.Sc Forest veterinary Officer (Retd)	Current usage of Diclofenac and other NASID in rural veterinary practice
15	Dr. N. Kalaivanan, B.V.Sc Assistant Veterinary Surgeon, Theni	Secondary phorate poisoning of large carnivores in India
16	Dr. Vijayaragavan, BVSc Forest Assistant Veterinary Surgeon, MTR	Post mortem analysis of White-rumped Vulture in Mudumalai Tiger Reserve - A case study
17	Mr.S. Manigandan, Biologist, ARULAGAM	NASIDs prevalence survey in the Nilgiris
18	TEA BREAK	
	Dr.B.A.Daniel, Scientist, Zoo Outreach Organization, Coimbatore Plenary Talk	Maligned Hero-Birds: Importance of Conservation awareness Programmes on Vulture Conservation
19	Mr. Arunagirinathan, Coordinator, ARULAGAM	A Synopsis of Vulture Safe Zone Activities Undertaken By Arulagam 2012-17
20	Mr. A. Samson Ph.D. Research Scholar Department of Zoology & Wildlife Biology, Govt. Arts College Udhagamandalam.	People's perception on vulture conservation in Tamil Nadu Part of the Nilgiri Biosphere Reserve, Southern India.
21	TECHNICAL SESSION – IV: MANAGEMENT IMPLICATIONS	
	Mr. S. Bharathidhasan, Secretary, ARULAGAM	Legal Battle to Remove The Stay on the Ban of Multi Dose Vials of Diclofenac
22	WWF- India	Screening of Vulture clippings

	POSTER PRESENTATIONS	
23	Mr. A. Samson Ph.D. Research Scholar	Do anthropogenic activites affect White-Rumped Vulture Nesting Colony: A Cause Studies For Siriyur Nesting Colony, Nilgiri North Forest Division, The Nilgiris, Tamil Nadu
24	Mr. A. Samson Ph.D. Research Scholar	Impact Of Awareness On Conservation Amongthe School Students In The Sigur Plateau, The Nilgiris
25	Ravikanth Manchiryala Telangana	Conservation of Indian Long-Billed Vulture (Gyps Indicus) At Palarapu Cliff, Telangana, India
26	Lekeshmanaswamy,M Kongunadu Arts Science college, Coimbatore	Population Status of The Endangered Vulture (*Gyps Bengalensis*), Nilgiri District, Tamilnadu, India
27	Lekeshmanaswamy,M Kongunadu Arts Science college, Coimbatore	Impact Of Meloxicam Drug An Alternative For The Diclofenac Toxicity On The White Backed Vulture (*Gyps Bengalensis*), Nilgiri District, Tamilnadu, India

28	Mahaly Moorthi AVC, College Mayiladuthurai	State Of Vulture Population and Its Need For Awareness Among Public About The Role Of Vultures In The Ecosystem
	DAY – 2, 09/01/2018	
	GROUPS FORMATION	
1	Group Discussion	Group-1. Standardizing methodology for vulture population estimation & Research activities Group-2. Conservation threats & Management implications
	LUNCH BREAK	
2	Summarize group discussions and resolution preparation	Presented by the respective group facilitator
3	Vote of Thanks	Dr. B. Ramakrishnan Organizing Secretary