
ZOO'S PRINT

Magazine of Zoo Outreach Organisation

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Teacher training using drama in Nagaland, Pp. 4-7

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First Arabian Zoo and Aquarium Meeting in Al Ain

Delegates from throughout the Arab world and guests from WAZA meet for discussions at Al Ain Zoo to set up a Regional Zoo Association for the Middle East ... an ambitious project!

On a "magic" day of 12-12-12 over 30 zoo managers from zoos and aquaria from 6 countries in the Middle East and 3 invited guests from zoo associations in different parts of the world gathered to discuss pros and cons of creating a regional zoo association for the middle east and collaborating on different activities and projects.

The delegates and guests were given a tour of the lovely Al Ain Zoo, partly by zoo train and by strolling. The countries included UAE, Qatar, Morocco, Saudi Arabia, Kuwait, Jordan and Bahrain for delegates and Europe, USA and South Africa for guest resource persons. A gala dinner that evening at the zoo put all in a mood to work hard the next two days, having had preliminary discussions with one another on topics involving collaboration with a variety of initiatives, e.g. raising standards of animal care and conservation research animal breeding, and education as well as fundraising.



H.E. Ghanim Al Hajeri, Director General of ZAPIA welcomes guests and delegates on the first day of the meeting.

The following day H.E. Ghanim Al Hajeri, opened the meeting and introduced guest speakers from different continents: Dr. Gerald Dick, Executive Director of the World Association of Zoos and Aquariums (WAZA), Switzerland; Sally Walker, Director of the South Asian Zoo Association for Regional Cooperation (SAZARC), India; and, Dr. Stephen van der Spuy, Executive Director of African Association of Zoos and Aquaria (PAAZAB) in South Africa. Photo below.



After their presentations, H.E. Ghanim Al Hajeri spoke about Al Ain Zoo, ZAPIA, and then requested all delegates to describe their institutions for the rest of the day. This would provide a solid introduction to the following day's programme of working groups. Member institutions were able to discuss challenges faced and opportunities that could be tackled together. An established network provided enormous potential to overcome these challenges to promote the cause for wildlife preservation and conservation.

Ghanim added that the meeting facilitated open dialogue among zoological institutions across the Arab region. We share a precious cause, he said, and Al Ain Zoo is leading this initiative as part of its ongoing commitment to the highest standards of animal welfare, and towards wildlife conservation and preservation on a greater, regional level. He extended deepest appreciation to guest speakers for sharing invaluable insight, and to regional counterparts for their enthusiastic participation."

ZAPIA is a proud member of WAZA - an organisation committed to promoting animal welfare standards around the globe - and is actively involved in several internationally coordinated conservation projects and works with other like-minded organisations such as Environment Agency - Abu Dhabi, The Species Survival Commission, San Diego Zoo, Edinburgh Zoo, World Conservation Union and Species Survival Commission, the Northern Rangelands Trust of Kenya and the Sahara Conservation Fund to conserve and re-introduce threatened arid land species - Arabian Oryx, Scimitar-horned Oryx, giraffes & gazelle.

Al Ain Zoo

Al Ain Zoo is a family destination, providing entertainment and learning experiences in a natural outdoor environment. Visitors of all ages discover the zoo's wildlife and enjoy a great day out, packed with fun and adventure, while learning about conservation. They can explore a collection of over 4,300 animals. *Al Ain Zoo* is home to an internationally important conservation programme focusing on the wildlife of the world's arid regions, the zoo is involved in conservation research, captive breeding and propagation and the reintroduction of threatened species to their wild habitats. Collection of desert antelopes is recognized as among the best in the world. *Al Ain Zoo* is a proud member of the World Association of Zoos and

Aquariums (WAZA). Strategic partnerships have been set up with leading zoos, conservation agencies and associations from across the world, including the World Conservation Union and Species Survival Commission, Environment Agency - Abu Dhabi, San Diego Zoo, Edinburgh Zoo, the Northern Rangelands Trust of Kenya and the Sahara Conservation Fund.

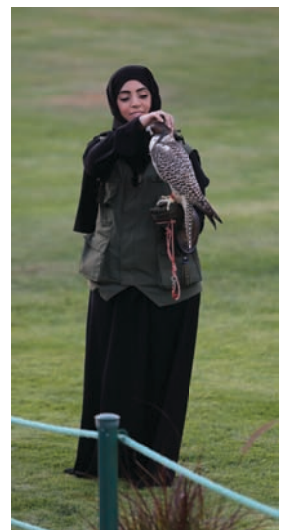


Zoo Train transported guests and delegates around the zoo

The Zoo is transforming the area into a new institution dedicated to exhibiting, interpreting and conserving desert wildlife. This sustainable leisure and learning destination, called *Al Ain Wildlife Park & Resort*, will provide an extraordinary opportunity for visitors to explore and learn about the desert world and experience a world-class tourist destination.

A more detailed report will be available next issue of *ZPt* in January 2013.
Editor.

Bird show at Al Ain Zoo



Dr. Miranda Stevenson, O.B.E. - an innovator and a dynamic influence in zoo conservation and welfare - honoured by the Queen of England.

This belated announcement of a very prestigious award to an outstanding individual is long overdue. It is so because the recipient is this writer's best friend and, as happens to all of us at times when discussing (or trying to discuss) someone or something we know and love very well, I could not gear myself up to do justice to either the award or the recipient. This being the last issue of ZPt for 2012, I realised I had run out of time. Being this late is bad 2013 would be unforgivable.

My friend is Miranda Stevenson -- zookeeper, zoo curator, zoo director, regional zoo association chair -- and the award is the OBE Order of the British Empire for selfless service to wildlife, animal welfare and conservation. Miranda was awarded the OBE in 2012's New Year's honours in United Kingdom.

Created by King George V in 1917, the OBE recognises distinguished service to arts and sciences, public service and work with charitable and welfare organisations of all kinds. King George recognised the need for a new symbol of honour that could be more widely awarded, in recognition of the (then) people helping the British war effort both as combatants and as civilians on the home front. Women were included in the Order and also foreigners who had helped the British war effort. George also intended the Order should be used to reward services to the State in a much wider sense following the war. Thus, now, the OBE is the order of chivalry of British democracy. Valuable service is the only criterion for the award, and the Order is now used to reward service in a wide range of useful activities. Even citizens from other countries can receive an honorary award for services rendered to the United Kingdom and its people, and at present there are over 100,000 living members than 100,000 living members of the Order throughout the world.

Miranda Stevenson has been an innovator and a dynamic influence in the areas of animal welfare, standards of care and quality of life, best practice, and conservation, first in her home zoo of Edinburgh, and later at Marwell Zoo and finally as Director of the British and Irish Zoo Association. She became involved with international cooperative breeding programmes for endangered species. Although her Ph.D. featured primates, Miranda was equally interested and concerned about other wild animals and their needs in nutrition, welfare, living



Miranda Stevenson, O.B.E., proudly displays the medallion for the much coveted OBE Award, richly deserved.

conditions, etc. She has been deeply involved in zoo forums and in other official zoo agencies or organisations such as CBSG, WAZA, Global Zoo Forum, etc.

Miranda has mentored many people throughout her career including this writer. She is personable, kind, and generous with her time and her knowledge. Her combination of humility and generosity are admirable and make her completely approachable, for which I am grateful, as she became my mentor and friend.

Quoting from Lifelines, the BIAZA quarterly publication, many senior zoo managers in the zoos of England are indebted to her guidance early in their careers and agree that she has been "an architect of modern zoo philosophy and practice. She has inspired many people and achieved remarkable advances in zoo biology and zoo conservation." Also the BIAZA President, Sir Drummond Bone commented that the OBE was well deserved and reflected not only "all the work which Miranda put

into our community over the years, but the progress she has made in raising the profile of zoos and aquaria generally." EAZA Chairman and former BIAZA official, Dr. Simon Tonge said: "Miranda has been a great colleague and inspiration to the UK zoo community over many years and her OBE award is richly deserved."

Speaking for myself and many of my colleagues from South Asia, Miranda has been a tremendous help and a role model for all zoo personnel. Miranda was primary resource person for several conferences of the South Asian Zoo Association featuring animal welfare, conservation, zoo legislation, etc. She has been one of our most popular and helpful resource persons and has promised that she won't stop helping SAZARC even after her shortly upcoming retirement, which is a great relief! She has taught in SAZARC conferences at Dhaka Zoo, Bangladesh; Lahore Zoo, Pakistan and National Zoo, Sri Lanka. She will also be a guiding force at an upcoming event to help SAZARC members to initiate national associations in their countries in order to draw more zoos into better communication, cooperation and coordination within their nation. This will also enable zoo personnel in all South Asian countries to attend meetings and conferences in their own country.

In addition to this, Miranda has been and is a valuable advisor to me in other projects associated with the Captive Breeding Specialist Group and World Association of Zoos and Aquariums. I rarely do anything without consulting her for advice and guidance.

So better late than never, Miranda! ... congratulations on your MANY achievements, your wonderful career, your sense of humor, your OBE honours and your future plans for continuing activities in zoos and conservation.

Sally Walker



Miranda as Resource Person (top) in Dhaka Zoo, Bangladesh; (middle) in Lahore Zoo, Pakistan and bottom in National Zoo, Sri Lanka.

From Catapults to Curiosity – Under the Canopy

An education program in Nagaland - a reflection on the last three years

Payal B Molur*

Introduction

"So when you see a bird in the tree outside your house you don't want to kill it and eat it?"

I was stunned – no one had ever asked me something like this and I realised that this was it – this was the fundamental difference in what influences our kids. It was 2010 and I was in Nagaland in Phek district conducting the first ever teacher training program for educators on bringing wildlife education into the community to wean kids away from hunting.

Flying into northeastern parts of India one is struck by the serene, breathtaking views of Snow capped mountains, rivers and undulating forested hills with villages nestled in the valleys.

Being one of the 4 biodiversity hotspots found in India it is no wonder that it has some of the most beautiful forests, exquisite animals and a traditional people who are as vibrant and diverse as the forests they live in. But the area is under severe threat from several factors - *Jhum* Cultivation (slash and burn), Deforestation – timber extraction, and one of the biggest threats – Hunting. Hunting for tradition is seen all over the North east - in one village, for example, a tall 20-30 feet bamboo stalk is placed in front of a hunters house with birds and small animals hung as an offering to the gods.

Shields made from bear skin, dhows or sword sheaths made from snow leopard skins, hornbill feathers used in head gear and even the entire wings of birds worn by young boys and men during festivities are very common.

Hunting for meat is widespread and an accepted fact in these parts. Unlike earlier times hunting for wild meat was done to prove ones status in the community or subsistence, today, trends in hunting have changed. With easy access to the gun (especially the airgun which does not require a license) most of the youth become hunters.



A Leopard cat being sold on the road between Kohima and Dhimapur



Squirrels for sale in the market

The sheer numbers of wild meat that reach the markets every morning is staggering. What is important to understand is that only 25% of wild meat reaches the market - most is consumed at home to augment the regular food as the people love the taste of it, not for tradition.

And what the kids see they copy - kids as young as 4 years old wield a catapult and take pot shots at wildlife.

But unfortunately this unchecked hunting is having a drastic affect on wildlife. In some states like in Nagaland species like the Hoolock Gibbon and the tiger have all but disappeared.

Protecting forests in the northeast is harder than in other states of India as only 35% of the forest land is under state government control, the rest of the forests are controlled by village communities and under private ownership.

This emphasizes the need for communities to understand and to protect their own forests. In 2009 Dusty Foot Productions began Under the Canopy with the objective to

- . Reconnect kids with nature
- . Channel energies from hunting to curiosity
- . Exposure kids to alternative career options that still linked them to their forests and harnessed their indigenous knowledge and skill.

Our research led us to Chizami Village about 4000m above sea level in the Phek district of Nagaland – with a population of just 3000 people it is the quintessential sleepy village abutting the Myanmar border. 97% of the people are converted Christians. The village has limited electricity, most houses use firewood for cooking. It is a peace loving tribe whose youth are caught in a flux between the modern & tradition.

*Conservation Education, Go Wild, Coimbatore. Email: payal.bmolur@gmail.com



The first batch of trainers from Under the Canopy at the NEN Chizami site

North east Network an NGO in Chizami was started by a young woman – Seno who was inspired by a talk given on the importance of women health issues in uplifting a community.

We heard about them and approached them to see if they would be willing to bring in Wildlife Education to help mitigate hunting among youngsters by training trainers. We showed them some of the existing material done by Zoo Outreach Organisation and after the initial meeting they not only grasped the importance of such a program but also had the confidence that they would be able to take it forward.

Wanting the training manual to be area specific we started our research by talking to the local hunters. Two of the NEN personnel Wekowe-u and Tzekote collected local information from these hunters about the animals they had seen as well about local traditions and folklore about animals. They sent me the list but it was in Chakesang language, then using picture books of animals of India and the hunter describing the animal we figured out what was what.

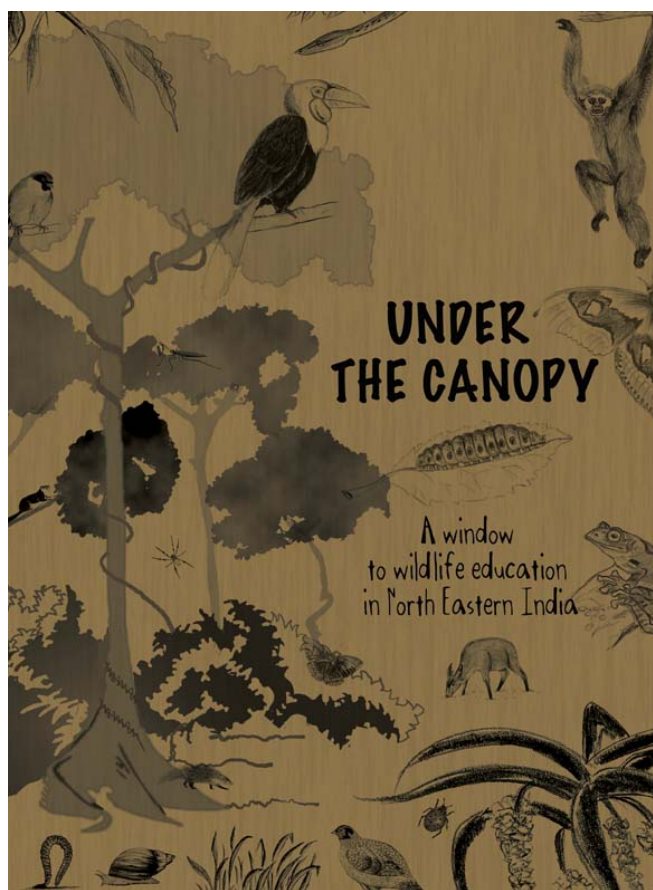
The difference between the elderly hunter & the young hunters was stark – the older man had used traditional ways of hunting & knew each animals natural behaviour and habits - His skill as a hunter was dependent on this indepth knowledge of the animals.

Whereas the younger hunters had little or no knowledge about the animals. They mostly use guns and a few traps and caught whatever they saw. The old hunter also said that in the olden days he did not have to go further than a 500 m from the village to find wild meat but today to get any game one had to trek 15-20 km towards the Myanmar border.

Finally after four months the 150 page teacher training manual 'Under the Canopy' was ready. Modelled around the successful Teachers for Tigers manual by the Bronx zoo, WCS for India and the hoolock gibbon teacher training manual made by Zoo Outreach Organization, this manual was specially designed as an interactive guide for teachers to use with their students to impart basic knowledge about wildlife and it's conservation in Nagaland. The manual started with the basics about food chains, and progressed to understanding NE biodiversity, its importance - climate change and its effects, as well as how community conservation efforts could make a difference.

We realised that for this to work we needed a healthy mix of regular school teachers, Sunday school teachers and youth leaders from the villages. 27 participants came from 7 different villages – 3 districts. A great boost to the program was having 2 participants from the first Green Village of North East India Khonoma who 10 years ago managed to convince their elders to ban hunting in forests all around their village.

Since it got dark by 4 pm, and with electricity being a problem. It was a challenge for my team Vedika, Imrana and myself, all coming from urban backgrounds, managing to prepare the workshop material by candle light the night



'Under the Canopy' funded by EGP an educators manual for NE India.

before the workshop with temperatures as low as 2° C with no heating.

Keeping in mind the teachers would finally be dealing with young kids all the concepts in the manual were activity based, game oriented, explorative and enquiry based learning techniques.

Education Material from Zoo Outreach Organization on Amphibians, Bats & Primates was immensely useful while conducting the program. Each participant was given starter packets to use with 25 kids in their area. They were taken through each item in the packet and shown how to use it. Using the booklets provided their knowledge of each species increased and they were given the confidence to impart the information to others.

Nature Conservation Foundation's manual for kids on Arunachal animals 'Secrets of the rainforest, was also given to us to distribute for free. The wild meat trail film was screened and given to all the participants. By the end of the first day we could see the change in several of the participants. To give an example, one of the participants asked me – so when you see a bird you don't wonder how tasty it might be?..... I had to very honestly say no – and that was the key difference in the way we described animals to our kids then the way he might – we would say look at the beautiful bird – look at it pretty feathers - where as when they described a bird to their kids they would say look that it is a tasty bird... this is how we could catch it.

Four months later we did a 2 day refresher to get feed back and assess the success of the manual and to see what we could do next. During the refresher the Dusty Foot Productions team conducted a short course in basic



Trainers initiation to ZOO education packets and understanding amphibians

camera techniques for some select teachers who showed a desire to initiate this in their schools.

The response was overwhelming – most of the teachers and Sunday school workers had already begun wildlife talks at the schools. In two of the villages a part of the community forests were declared protected and hunting in these parts was banned. Several of the participants had stopped eating wild meat – in fact they said that the desire to do so had greatly diminished and had stopped their families too. Our partner NGO North East Network took some of the village elders from Chizami village and the neighbouring Enhlumi to the Kaziranga National Park. After their return both villages declared a section of forest closed for hunting and slapped notices around stating that a fine of Rs 2000/- would be charged if anyone was caught even carrying a gun or hunting equipment in the protected areas.

But the biggest outcome was the initiation and fund raising efforts on the part of the North east network, Dusty Foot Productions and Go Wild for a three year wildlife program for kids in the village. A generous grant from EED/MISEREOR, Germany enabled us to launch the program.

In the first week of December 2010 children between the ages of 9-14 join the first eco-club ever was started at the NEN Centre. As the kids are from three different schools and from different classes and the topics wide and varied, the format used to run the eco-club was set that each academic year is divided into three segments, each beginning with an intensive workshop, run by external experts in the fields of photography, writing, art and wildlife followed by 4-month long sessions run by two local trainers called master trainers.

The workshops have been based on the seasons and the animals prevalent at that time, for example during the monsoons sessions revolve around amphibians, moths, spiders and fungi. The children after much deliberation decided to call themselves the 'Hoolock Gibbon Eco-Club' as this lovely animal used to roam their forests freely once, according to the old hunter who had last sighted them near the village 15 years ago. In the first year the children and two trainers Tshetsholo Naro and Kewekhrozo Thopi were given a wide range of exposure in the field of basic wildlife of India and basic camera techniques by the Dusty Foot Team (Rita Banerji, Shilpi Sharma, Maya Khosla, Sanjay Barnela) and the Go Wild/Titli Trust Team (Payal Molur and Sanjay Sondhi) four aspects were covered:



Teacher training using drama from the manual Under the Canopy



The first batch of eco-club members learning how to biomap the area around them

- Learning about wildlife and plants of Chizami Community Forests and the North East of India in a systematic manner.
 - Learning how to handle and use field equipment such as a compass, Binoculars, GPS etc
 - Learning how to create awareness programmes through posters, campaigns, theatre and music.
 - Learning how to use still cameras
- Over the year the kids were taught about amphibians, birds, butterflies, moths and reptiles.

In December 2011 the second batch of 20 children joined the club and the senior batch moved on to specializations. Children of this village and neighbouring villages specialized in a subject area and were a part of three units: Research, Awareness and visual documentation.

A three-month research project was covering an area of 2.186 sq. km in the Chizami forest (Kesorapa). The students were divided into four teams and each team had to study a different aspect of the forest, such as waters bodies, herbal plants, trees, amphibians and birds.

Awareness: Two newsletters, a book on butterflies of Chizami and a book of Haiku poems and wildlife photographs done by the kids have been printed. In publication are several posters that will be used to create an awareness.

Research: The kids have also been documenting and creating a database of plant and animal life around the village. So far over 95 of birds have been identified and most photographed. Over 160 butterflies have been identified and even a new range extension for The Indian Tortoiseshell (*Aglaia cashmirensis aesis*) was published in the international Journal of Threatened Taxa <<http://www.threatenedtaxa.org/>>

ZooPrintJournal/2012/April/o301926iv122534-2535.pdf>.
Video and Camera: to augment the booklets and the research as well as they held a photo exhibition to create awareness in the village especially during Wildlife Week and World Environment Day. They also for the first time had a debate by the youth 'for and against' hunting in the village. They had a special session on Spiders by Manju Siliwal from ZOO, Coimbatore and two of the senior batch children accompanied her as guides to document the presence of tarantulas in the forests around the village.

Field Trips: 10 kids represented the club and along with the two trainers participated in the Vatavaran Festival at Delhi and performed the opening song for the program.

YEAR 3- to Begin Dec 2012

A project that will affect change. While the first group will keep graduating every year, there will be new members who will be initiated in the same manner. This will only

depend on the progress of the first group and continued funding – we are also hoping that the eco-clubs become self sufficient. The senior members now will be the guides and mentors for the younger groups. Eco Tourism and Training to be Eco Guides would begin. Create awareness education packets using the tried and tested ones developed by ZOO as examples to motivate the youngsters in the village to give up hunting and save wildlife. The Children are given SMART objectives that will help them plan and execute a one year community participation project that will make a concrete change. They use all the skills learnt over the previous years in video documentation, research, awareness campaigns and other techniques to achieve the targets. The senior most batch has already decided to take up a year long project on various aspects of hunting and mitigation in the village.

The program is into its third year now and has children from neighbouring villages attending as well. However to sustain the club needs further funding for the years to come. There has been a lot of interest to take this model to other areas around the North East of India as well. There has already been a sea change in the attitude of the children and through them their families and village elders towards the touchy topic of hunting wild meat.

None of this would have been possible without the dedication of the North East Network Chizami staff and the motivation of the master trainers and experts from Dusty Foot Productions, Go Wild and Titli Trust. A special thanks to Zoo Outreach Organization for providing education packets and other material whenever asked for. For more information or to contribute please do contact us.



The second batch tying a friendship band/rakhi and promising to protect bats and all other creatures

Cop 11 Indian Alliance for Zero Extinction Side event, 17 October 2012 at Hyderabad, India

Priyanka Iyer*

Alliance for Zero Extinction is the coming together of different Non Government Organizations across the globe to prevent the immediate threat to species extinction!

The Alliance is an initiative to develop conservation strategies for species assessed as Critically Endangered or Endangered as per IUCN categories and criteria found in a single location. The ideology of setting up the Alliance is in tandem with the Convention on Biological Diversity (CBD) Aichi 2020 Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

The Alliance for Zero Extinction (AZE) sites are declared based on three criteria:

Endangerment. An AZE site contains at least one Endangered (EN) or Critically Endangered (CR) species, as listed on the IUCN Red List.

Irreplaceability. An AZE site is only designated if it is the sole area where an EN or CR species occurs, contains the overwhelmingly significant known resident population (>95%) of the EN or CR species, or contains the overwhelmingly significant known population (>95%) for one life history segment (e.g. breeding or wintering) of the EN or CR species.

Discreteness. The area is a definable boundary within which the characters of habitats, biological communities, and/or management issues have more in common with each other than they do with those in adjacent areas.

Globally 587 AZE sites are identified based on these three criteria and these sites are inhabited by 920 species of mammals, birds, amphibians, some reptiles and conifers.

The Alliance has national representations in Brazil, Mexico, Colombia and India among others. The Indian Alliance for Zero Extinction



Russ Mittermeier describes the global impact of AZE.
Photo: Priyanka Iyer



Nick Holmes explains the close linkages of Island Conservation and AZE through the many case studies. Photo: Arun Kanagavel

(Indian AZE) was established in January 2011 to bring together NGOs in India to prevent extinction of the Critically Endangered and Endangered species found in a single location in India. Currently, the NGOs that have joined hands in this endeavor are Aaranyak; Conservation Research Group; Agumbe Rainforest Research

Station; Biodiversity Research and Conservation Society; Biome Conservation foundation; Keystone Foundation; Madras Crocodile Bank Trust; Society for Wildlife Conservation, Education and Research; Titli Trust;

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Table 1. Seventeen Indian Alliance for Zero Extinction species listed in 2010

Wildlife Information Liaison
Development Society; Wildlife
Research Conservation Society; and
Zoo Outreach Organization.

Post the 2010 listing the Indian AZE has identified 21 AZE fish species and 14 AZE plant species based on the freshwater assessments conducted in Eastern Himalaya and Western Ghats by the IUCN Freshwater Biodiversity Unit and Zoo Outreach Organization (Table 2). One tarantula is also recognized in this Indian AZE list. This list provides an idea of species in India that are highly restricted in distribution and at a very high risk of extinction with the highest priority for undertaking status survey, and developing and implementing conservation plans.

A Poster on Alliance for Zero Extinction (AZE)

Oliver Langrand of Island Conservation and AZE Steering Committee member introduced the programme, the AZE concept and about the Seven Wonders of Conservation, an initiative to identify, through social networking, the world's top seven AZE species/sites. Along with him two other AZE Steering Committee members, Russ Mittermeier of Conservation International and Sanjay Molur of Zoo Outreach Organization were part of this side event along with other speakers and supporters, Jane Smart and Aban Marker Kabraji of IUCN, and Nick Holmes of Island Conservation. Dr. Russ Mittermeier spoke about the Alliance and its impacts thus far including the effects the objectives had influenced the Target 12 and the new initiative of Friends of Target 12. Jane Smart indicated her and IUCN's support to AZE and indicated that the AZE was a natural progression to the assessments conducted by the IUCN's famous Red List of Threatened Species. Aban Marker Kabraji spoke about the IUCN's Asia Regional Office being in full support of the activities of AZE and the

Table 2. Fish, aquatic plant and invertebrates recognized by the Indian AZE for priority action.

Sr. No.	Species Name	IUCN Status
Fish		
1	<i>Crossocheilus periyarensis</i>	EN
2	<i>Devario horai</i>	EN
3	<i>Garra kalakadensis</i>	EN
4	<i>Glyptothorax davissinghi</i>	EN
5	<i>Glyptothorax kudremukhensis</i>	CR
6	<i>Homaloptera santhamparaensis</i>	EN
7	<i>Horalabiosa arunachalami</i>	CR
8	<i>Hypselobarbus periyarensis</i>	EN
9	<i>Lepidocephalichthys arunachalensis</i>	EN
10	<i>Lepidopygopsis typus</i>	EN
11	<i>Mesonoemacheilus herrei</i>	CR
12	<i>Parapsilorhynchus prateri</i>	CR
13	<i>Psilorhynchus microphthalmus</i>	EN
14	<i>Pterocryptis barakensis</i>	EN
15	<i>Puntius deccanensis</i>	CR
16	<i>Puntius manipurensis</i>	EN
17	<i>Schistura minutus</i>	EN
18	<i>Schistura nagodiensis</i>	EN
19	<i>Schistura papulifera</i>	CR
20	<i>Schistura sijuensis</i>	EN
21	<i>Schistura tigrinum</i>	EN
Plants		
1	<i>Eriocaulon bolei</i>	CR
2	<i>Eriocaulon ratnagiricum</i>	CR
3	<i>Eriocaulon rouxianum</i>	CR
4	<i>Eriocaulon santapau</i>	CR
5	<i>Eriocaulon sharmae</i>	CR
6	<i>Eriocaulon sivarajanii</i>	CR
7	<i>Isachne veldkampii</i>	CR
8	<i>Ischaemum jayachandranii</i>	CR
9	<i>Ischaemum vembanadense</i>	EN
10	<i>Lindernia manilaliana</i>	EN
11	<i>Nymphoides macrospermum</i>	CR
12	<i>Nymphoides sivarajanii</i>	CR
13	<i>Podostemum munnarensense</i>	EN
14	<i>Rotala malabarica</i>	CR
Invertebrate		
1	<i>Poecilotheria metallica</i>	CR

need to identify more national AZEs within the region.

Nick Holmes presented insights into links between Island Conservation and AZE and mutual support. He began with explaining island ecosystems and the major threats plaguing them – invasive species! He also highlighted how it was imperative to remove alien invasive species from the system to prevent extinction on islands and some success stories in island conservation, many of which are also AZE sites.

Sanjay Molur made a presentation about Indian AZE with special emphasis on the Periyar Lake - Stream System (PLSS) case study initiated by the Conservation Research Group of Kochi, one of the members of the Indian AZE. The baseline data to support this information originated from the assessments of status and distribution of freshwater taxa (fish, molluscs, odonates and aquatic plants) across the Western Ghats conducted by Zoo Outreach Organization and IUCN Freshwater Biodiversity Unit supported by the Critical Ecosystem Partnership Fund. The Periyar LSS hosts three AZE species of freshwater fish species— Periyar Hill Trout *Lepidopygopsis typus*, Periyar Barb *Hypselobarbus periyarensis* and Periyar Latia *Crossocheilus periyarensis*—and another site, also located in Kerala, is Santhampara, a non-protected area which hosts two AZE species— *Horalabiosa arunachalami* and *Homaloptera santhamparensis*. Although occurring within the protected area, the freshwater species are not protected as they are under the negative influences of pollution from oil spills and introduction of exotic fish. The project is to address these concerns and to direct attention to the urgency of the situation. Local stakeholders such as the Kerala Forest Department and the local communities are very supportive of the initiative and are joining hands to battle the alien invasive species in this system.

The event was concluded with an interesting interactive session with participation from people belonging to different parts of the world. There were questions pertaining to protection awarded to freshwater groups in India and also sharing of case studies speaking of the success stories and

complications involved in conservation.

Organizations in India who are interested in becoming members may visit the Indian AZE website for more details <www.zooreach.org/indianaze/indianaze.html>

Organizations and individuals wishing to join in the conservation efforts of any of the above species, or wishing to start action on other AZE species may write to <herpinvert@gmail.com> or <zooreach@zooreach.org>



Human Elephant Coexistence teaching and educator skills training workshop: Nilgiri report

B.A. Daniel¹ and R. Marimuthu²

This workshop at Ooty is the second programme of the USFWS funded education project series for the year 2012 which was organized in collaboration with the Tamil Nadu Forest Department and Government Arts College, Ooty, from 26-28th September 2012. The workshop targeted the educators from the HEC areas such as Bempatty, Ithalar, Thalaikundha, Cherambadi, Gudalur, Maniyapuram, Konnachal, Thaiyakuni, Aruvankadu, Devala, Coonoor, Kayyunni, Nilgiri district. The above places are some of the important Human elephant conflict areas covered in this workshop. The aim of the programme was that after the training the trainees carry and spread the message of coexistence to the people at local level in HEC areas.

The Nilgiris district is located at the Western Ghats of Tamil Nadu, South India. The Nilgiris is bounded on North by Karnataka State on the West by Coimbatore District, Erode District, and South by Coimbatore District and Kerala State and as the East by Kerala State. The fringe areas of this district of Western Ghats have many villages and hamlets that experience severe human-elephant conflict HEC. Reports about loss of life of both human and elephant apart from materialistic loss due to conflict are not uncommon as reported in the local news papers. The influx of elephant populations in to the forest division occurs mainly during the post monsoon and dry season periods. Elephant population from Bandipur Tiger Reserve, Mudumalai Wildlife



Inaugural address by B. Sugirtharaj Koilpillai, IFS, DFO

Sanctuary, Nilgiri North and South Wildlife division intensifies for a period of 3-4 months at a density of 1.5 elephants per sq km.

Many people are working on Human Elephant Conflict HEC and have failed to find a "solution". People involved in HEC appeared to be surprised when some action that worked like a charm when first attempted, failed miserably in a few days or weeks. This happens because elephants are very smart, they learn the tricks easily and react. Also it seemed that people involved in ground level HEC emphasized reactive and/or mechanistic methods, e.g., tools, devices, strategies, constructions, compensation, etc. These methods do not solve much and also don't provide long term protection to the humans and elephants, which get killed and injured on an almost daily basis as a result of conflict. In the process, the attitudes and behaviour of the local people who

suffer most from elephant conflict did not change in any way that brought about improvement, but only in ways such as becoming vindictive and reactive, that brought about more death and injury, in particular to the elephants but also even to themselves.

The workshop emphasis off mechanistic solutions for conflict and put it on coexistence. In so doing, we accepted that there was no permanent or all-encompassing solution to HEC due to its complexity and variety but that our approach would be through an age-old and imperfect method, coexistence. Coexistence is not a new method of living with elephants. People have been doing so for centuries. As all rural persons know, however, even government agencies cannot do everything at all times and be everywhere when crucially required. It is impossible. Yet, over the centuries and decades of the growth and evolution of democratic government, perhaps people have come to rely too much on government to come to their rescue. Government can definitely chase some elephants away, shoot psychotic rogues, proper advice and pay compensation but they can't bring a human breadwinner back to life, or restore a permanently damaged body or mind. Therefore, the workshop approach is "first and foremost" that individuals and families take responsibility for themselves, learn ways to avoid confrontation and promote self protection, become willing to exchange some old habits and beliefs for survival and thus reduce the incidence of injury and death due to HEC.



Conflict demonstration and solution: a drama scene

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At the same time they may also learn other techniques which may help them both "Get Along with Elephants" and salvage property, crops, etc., but our primary purpose is mitigation and reduction of incidence of death and injury, both to humans and animals. This for the simple reason that death is immutable and injury can affect life unbearably. A pre-workshop survey of residents of the Nilgiri district was carried out to document the state of mind of the people towards HEC and the attitude of the people towards elephants.

The three day workshop combined two themes: Human-Elephant Conflict and Human-Elephant Coexistence in order to satisfy our major objectives, e.g. 1. To empower educators to confront the issue of HEC and a partial "solution" HECx (Human-Elephant Co-existence) and 2. to demonstrate innovative teaching and learning techniques designed to change human attitudes and behaviour for the better.

The programme started with an inaugural where in Mr. B Sugirtharaj Koilpillai IFS, TN Forest Department during the inaugural spoke the need to address the issue of HEC and ways to change the attitude of the people so that both the animal and human can coexist.



Participants filling pledge card and commit to do programmes

The participants, during the workshop, received a copy of the Elephant teaching guide, "Getting along with elephant" packets and a drama kit along with guidelines. The teaching guide, both in Tamil and English were made available for the participants. It has chapters and components for training with the theme of the Asian elephants and HEC. The packet in local language contain items constructed of paper and string which help teach younger children the basic concept of HECx at their level. These packets were given to the training participants in numbers sufficient for use in their own workshops after the training. Drama kit contain a range of masks and props for use by trainers with their target groups.

These materials helped the trainers to thoroughly familiarize with the themes of Asian elephants as such and with Human-elephant conflict. They also learned effective "ele-do's and ele-don't's" relative to elephant presence to convey to villagers for protecting themselves and family from elephants. They practiced a new way of teaching about elephants, while giving practical advice for people who are actually in danger. They learned to use drama, games, academic activities, maps, history, politics, personalities, stories, debates, demonstrations, arts, mock conferences and evaluations to convey pertinent information which



Learning elephant History through illustration

helped to change their attitudes and in the long run their behaviour. During and after the workshop the trainees are encouraged to think about these teaching tools, not just for HEC/HECx and elephants, but for other species and issues as well.

At the end of the workshop the participants committed to practice what they learned. The workshop also had an evaluation and the feedbacks of some of the participants are given below:

The aims of the workshop on HECx completely reached us; the techniques are enjoyable and can be used deliver the learned methodology; I am sure that the workshop on HECx will definitely help to safeguard the Asian elephants; The three-day workshop was successful, well planned; Created interest about getting along with elephants; I have not heard of similar programmes before. Now I am motivated to do many programmes about HECx; I learned more and I developed myself with positive skills; I myself had awareness about the elephants, conflict and coexistence; A new experience in my lifetime. Total session was conducted with positive approach and participants involvements; I overcome my inferiority complex through this workshop; I was really lucky to attend this programme. Next time I will teach about HECx in my school and to my friends; The 3 days workshop was very well planned. Contents and delivery executed properly to the audience. Materials are very useful, informative and simple; In this workshop we were trained well and the contents of the manual was fully taught. We all felt each other like brothers and sisters, as family members though out the workshop. Personally we introduced each other and also gathered other details.

A follow up workshop has been planned in early 2013 so as to understand the impact of this training that will help coexistence of human and elephants. We would like to thank Dr. B. Ramakrishanan, Dr. J. Ebanasar and the Principal of Govt. Arts College Dr. Gopi for their cooperation and assistance extended during the planning and execution of the project.



Dr. Gopi, Principal, distributing certificates

The Barrier Lake experience - Conservation Leadership Programme's Leadership Training, Alberta, Canada

Martina Victoria Stephen Paul*

Two transits and almost 18 hours of flying had already worn me down when I climbed down the elevator at Calgary Airport. Two weeks of intense leadership training was awaiting me and here I was down and under with all that field work and travel; little did I know that it was the last time I would feel that way over the coming weeks. A pretty girl holding a CLP placard welcomed me at the checkout. Alyona and I became best of friends thence. Alyona is one of the many beautiful conservationists I met at the Conservation Leadership Program's Conservation Management & Leadership Training at Barrier Lake Field Station of the University of Calgary, in Alberta, Canada from June 16 - July 3, 2012.

Barrier Lake Field Station

Nothing could have spoken better of the training or could have endowed it with the best first impression the way Barrier Lake did. Located amidst the Rockies, with occasional visits from Grizzlies, Black bears, Rocky Mountain goats, foxes, wolves and deers, the field station was a wonderful welcoming place for us people who had travelled from all around the globe.

Training

The next couple of weeks set abuzz with a train of activities and learning. We had training facilitators from all over the world, from different walks of conservation experience, equipping us in all aspects of conservation ranging from

project planning to fund raising, from conservation education to conservation communication.

As a beginner conservationist, I found the Conservation Leadership module of the training to be of real interest and beneficial. Drawing off the experience and wisdom of conservation leaders from across the world, the module enunciated the various styles of leadership, their strengths and lacks, and helped me realize my own leadership style. Project Planning and Management module helped understand the intricacies of project planning. We were allowed to work on an existing case study, draw out plans for a conservation project on the same, and arrive at a solution.

Communicating conservation through popular media such as newspapers and television well informed us on the nuances of developing public relations skills and techniques. The practical coursework of live interviews on our current conservation project was the highlight of the module-each of us was thrilled to hear and see ourselves on the television screen. Behaviour change through Education module allowed us to explore various outreach tools that we might use in our project. The power of group work is indeed amazing: we all came up with a creative outreach display in less than an hour.

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Media and messaging session. Photo by CLP

My favorite part about the whole training is the "CLP-POD" arrangement. All the trainees were divided into four or five groups called PODS. The idea behind CLP-POD arrangement is to connect conservationists from around the world enabling them to share their experiences and problems and draw upon each other's expertise to arrive at solutions.

People:

Group work and team assignments brought different cultures together and there was active sharing of ideas and experiences. Culture Night gave us all the opportunity to learn about other culture and exhibit our own. The oneness of the vision of conservation evident across all borders and boundaries was awe-inspiring and encouraging.

A note of thanks:

I would like to say a big huge thanks to Robyn Dalzen, Julie Lewis, Christina Imrich, Kiragu Mwangi, Stuart Patterson, Christine Ageton, Maureen Ryan, Martin Davies, Martin Fowlie, and

Nalini Mohan for the unforgettable learning experience, the chefs for the lip smacking food that allowed us to go on with the training with ever renewed strength, and all the wonderful people I met at Barrier Lake for the unparalleled awesome experience

and the ever bubbling hope I gained for a peaceful green earth. My team and I are extremely thankful to CLP for the wonderful learning experience and also for the funds that is helping us this far to work for conservation.



At Barrier Lake. Photo by CLP



At Lake Louise, Alberta. Photo by CLP

Combining field work with GIS analysis to produce a Land-Use Map

Walter B. Burwell III¹, Kamal Medhi^{2*} and Arpan Sharma³

In many parts of the world, forests are threatened for a variety of reasons. In order to protect these wooded areas, and the valuable resources they provide, many conservation organizations have begun mapping the forest cover in the regions in which they work. This effort stems from a need to focus conservation action, to figure out where protection initiatives are most necessary and which measures will be most helpful. Recently, owing much to the increased availability of satellite imagery, remote sensing has become a commonly used tool to assess land cover (particularly forest cover) across many landscapes.

Remote sensing allows conservation practitioners to understand the land-cover for a large swath of area with comparatively little man-power or field effort and thus provides an expedient means to understand conditions on the ground. However, it has some significant drawbacks, which can lead to improperly classified images and land-covers, producing misleading results. Often, a minimalist approach to groundtruthing (or gathering data about forest cover in the field) can contribute to such problems. A lack of technical expertise can also create issues when classifying images.

Remote sensing particularly troubled us with its definitions. Attempting to prioritize conservation action around Balpakram National Park in north-east India, we turned to a 2009 report generated by the Forest Survey of India. Utilizing remote sensing techniques, the Forest Survey found the forest cover in the Indian state of Meghalaya to be increasing and currently standing at 77.23% of the state's total area (FSI, 2009). Specifically, in South Garo Hills District, the Forest Survey reported 91.35% of the area to be covered by forest (FSI, 2009). However, the report employs a broad definition of forest cover, "All lands, more than one hectare in area, with a tree canopy density of more than 10 percent irrespective of ownership and legal status. Such lands may not necessarily be a recorded forest area. It also includes orchards, bamboo and palm," (FSI, 2009). This loose definition led to the inclusion of lands as "forest" that harm biodiversity more than help it. Additionally, the maps generated from the remote sensing effort did not provide the necessary scale for the landscape level at which we worked. We realized we would have to utilize a methodology other than remote sensing in order to understand better what forest acreage remained intact around Balpakram National Forest.

In early 2010, we visited various *akings* (or communal land holdings) which border Balpakram National Park in South Garo Hills District, Meghalaya, India. The purpose of these visits was to gather data on forest cover (as opposed to orchard cover) and various environmental threats in the area. We then planned to place this data on a map, in essence creating a land-use map. We divided the analysis area into three basic land-use categories: Orchard Cover (under intense and constant cultivation by humans), *Jhum*/Forest Mix (area that is under shifting cultivation by humans), and Natural Forest Cover (under no agricultural cultivation by humans). Since we found elephant dung in both *Jhum*/Forest Mix and Natural Forest Cover areas, we assumed that both areas provided some sort of suitable habitat for elephants, the focal species of the analysis area. Environmental threats we defined as any human activity which involves a dangerous amount or method of resource extraction, directly destroying habitat (e.g. coal or uranium mining). To the map the data, we combined two different methods. With the first method, community mapping, we used data on the topography of the region to generate maps of elevation (i.e. valleys and hills) at the level of each *aking*. This topographical data also allowed us to determine where streams are located in the landscape.

Using these base maps as reference, we conducted interviews, in Garo (the local language), with as many members of each *aking* as possible (never less than four), always involving the *nokma* (or headman). In these interviews we asked *aking*

members where forest cover and environmental threats occur in their *aking* and we then drew these features together on the *aking*-level map. We were able to pinpoint accurately our location on the map by measuring our distance from a fixed point in the center of the *aking* whose location we determined before arrival. After establishing exactly where we sat, we identified various points of reference (i.e. hills and streams) on the map to the *aking* members so that they would understand what we were all looking at. We then drew in forest cover and environmental threats together on our map.

After filling in the paper map, we next employed the second part of our methodology. We asked to visit the sites of forest cover and environmental threats with members of each *aking* to verify what we learned in the interview. We used GPS technology to keep track of where we had walked during the day and to make digital signposts of what we had seen. The GPS unit also allowed us to accurately measure how far we were from a fixed point in the center of the *aking* in our community interviews. It told us in which direction the aforementioned center point lay, so that we could use a scale bar and north arrow (both included on the printed *aking* maps) to determine our position (relative to how far away we were from the center point and in which direction). We combined the data of our visits collected with the GPS with the maps from the community interviews to make sure we had the most accurate picture of the landscape. Having surveyed 395 square kilometers of the 1689 square kilometer South Garo Hills district (or 23.4%) we have found that total forest cover (including both *Jhum*/forest mix and natural forest cover) in South Garo Hills, directly abutting Balpakram National Park, averages a paltry 27.32% (standard deviation ± 16.67) in each *aking*. Including government reserves (215 square kilometers or 54.4% of the analysis area), the total forest cover mushrooms to 74.0% of the total area. This figure, however, reflects an analysis area that contains half of Meghalaya's National Parks and two-thirds of its Wildlife Sanctuaries in less than a quarter of the total district area and still lies directly in contrast to the stated 91.35% which the Forest Survey of India has determined for the entire South Garo Hills District (FSI, 2009).

This field-based methodology reflects a vast improvement over typical remote sensing techniques. Our method is far more comprehensive and includes multiple sources of data, *Aking* the resulting analysis much more robust and producing a more accurate understanding of forest cover in the landscape than standard remote sensing techniques. Collecting the data on foot takes more time than remote sensing, but it also allows for important community education work as we are able to explain the benefits of keeping forest intact to local community members as we work with them. Furthermore, the extensive groundtruthing work we have done in this area will allow us to scale our work up and undertake a remote sensing effort with a much better defined understanding of forest cover, resulting in a more accurate remote sensing effort than the usual techniques.

This methodology is not limited to identifying forest cover, but can be used to map any land-use patterns in almost any terrestrial conservation project. Since land-use is one of the key factors determining impacts on biodiversity, understanding what kind of effects are occurring and where these effects are *taking* place is of paramount importance to achieving practical conservation goals.

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Sand Impaction in Capybara

Shanaz Amin¹ and Naim Akhtar²

The capybara (*Hydrochoerus hydrochaeris*) is the largest living rodent in the world. It is native to South America and inhabits savannas and dense forests and lives near water bodies. Capybaras are herbivores, grazing mainly on grasses and aquatic plants, as well as fruit and tree bark in wild. They are very selective feeders some time and will feed on the leaves of one species and disregard other species surrounding it. While they eat grass during the wet season, they have to switch to more abundant reeds during the dry season (Barreto and Herrera 1998). In wild, plants that capybaras eat during the summer lose their nutritional value in the winter and thus are not consumed at that time. The capybara's jaw hinge is not perpendicular and they thus chew food by grinding back-and-forth rather than side-to-side. Capybaras are also coprophagous, who eat their own feces as a source of bacterial gut flora, to help digest the cellulose in the grass that forms their normal diet, and to extract the maximum protein and vitamins from their food (Forero-Montana *et al.* 2003). They may also regurgitate food to masticate again, similar to cud-chewing by a cow (Lord-Rexford 1994). The capybara does not have the capacity to synthesize vitamin C hence been reported to develop gum disease as a sign of scurvy (Cueto *et al.* 2000).

Two male Capybaras (*Hydrochoerus hydrochaeris*) were diagnosed at Riyadh Zoo, Saudi Arabia with emaciation and anorexia a day prior to their death in November 2012. On postmortem examination, body condition appeared severely emaciated.

Mucous membranes were pale and dry. Pulmonary hypostatic congestion and edema was noted ventrally in the lungs of both Capybaras. Endocardial hemorrhages were observed in the left ventricular wall of the heart in the later Capybara. Liver appeared dark in colour and showed necrotic foci on the surface and areas of necrosis around the edges. Stomach and small intestines contained sand and mucoid fluid in the former capybara and were empty and inflated with air in the later one. Gastric and intestinal mucosa showed hemorrhages and congestion. Cecum and colon in the both Capybaras were filled with aggregated sand to the entire lumen. Mucosa of large intestines was necrotic and showed areas of hyperaemia. Urinary bladder was engorged with urine in the later. Kidneys showed discoloration



Photo 1. Dead Capybara

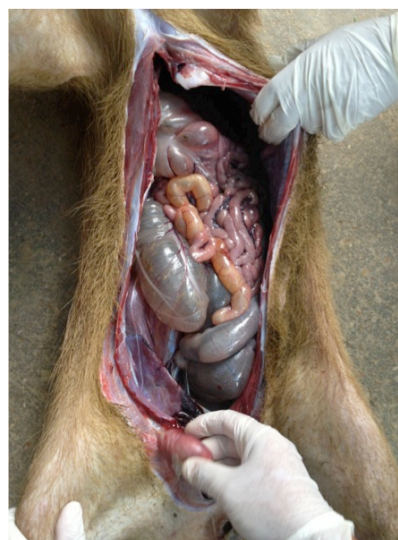


Photo 2. A view of intestine of dead



Photo 3. Another view of intestinal part of dead Capybara



Photo 4. The sand accumulation in intestinal part of dead Capybara

externally, petechial hemorrhages in both cortex and medulla, edema and congestion. Lesions were suggestive of sand impaction colic.

Sand impaction colic is particularly common in horses maintained in dry sandy regions of the world, e.g. Saudi Arabia. This type of colic arises when sand accumulates in the large intestine. The result is impactions of sand, most commonly at pelvic flexure and in right dorsal colon. A milder form of sand colic can also occur due to the abrasive effect of sand on the large intestine. The etiology of the sand impaction in capybaras maintained in the sandy regions can be due to overeating of sand to overcome dietary deficiency of essential minerals and vitamins.

To avoid excessive consumption of the sand and subsequent mortalities in Capybaras in captivity, it is recommended to the zoo managers that diet of the capybara's should be adequately enrich with the minerals and multivitamins, and stomach region of the animals be scanned on regular basis to assess the status of sedimentation of sand in intestinal region for possible intervention if require.

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Winter Avian Population of River Brahmaputra in Dibrugarh, Assam, India

Utpal Singha Roy¹, Anulipi Aich², Abhishek Roy Goswami³, Ajit Kumar Sen⁴ and S. K. Mukhopadhyay⁵

Abstract

The present study was carried out to record the avifaunal diversity and abundance of River Brahmaputra in Dibrugarh, Assam, India during the last week of December 2011. A total of 16 different bird species were recorded, of which five were winter migrants, one was passage migrant and rest of the ten bird species were resident. Though the present study area is facing an ever accelerating anthropogenic intervention, a healthy avifaunal diversity was recorded during the present study. More intensive investigations will certainly enrich our knowledge of avian diversity and distribution pattern from the present study location leading to the proper conservation of this important bird area.

Introduction

Brahmaputra with approximately 2,900 km length is a trans-boundary river in Asia that passes through the states of Arunachal Pradesh and Assam in India. The average depth of Brahmaputra is 38 m (with a maximum of 120 m) and it discharges on an average 19,300 cubic meters of water per second (floods can reach more than 100,000 cubic meters per second) (Catling 1990). This river is important in terms of irrigation and transportation though during the monsoon season (June – October), floods are common and occasional massive flooding causes huge losses to life, crops and property. Fresh alluvium deposited by floods replenishes the river valley which is important both in terms of agriculture and wildlife support. Two Endemic Bird Areas lies in Assam; these are the Eastern Himalayas (EBA 130) and the Assam Plains (EBA 131) (Islam & Rahmani 2004). Avifaunal diversity study of Brahmaputra valley semi-evergreen forests ecoregion are well on record (Neog 1957; Mackenzie 1969; Gauntlett 1971; Choudhury 1988, 1991, 1993, 2000; Barooah 1990, 1994; Barooah and Sharma 1999; Narayan and Rosalind 1990; Saikia and Bhattacharjee 1991; Robson 1994; Madge 1995; Samant et al. 1995; Sarma et al. 1997). The current study was carried out to record the avifaunal diversity and abundance of River Brahmaputra in Dibrugarh, Assam, India during the last week of December 2011.

Study Area

Brahmaputra valley semi-evergreen forests ecoregion has been included in the 200 global priority ecoregions identified by WWF in the year 2000. This region harbours a rich biodiversity and to conserve them a number of protected areas have been designated of which Kaziranga National Park is also a 'World Heritage Site'. Among the most notable animals of this area are the greater one-horned rhinoceros (*Rhinoceros unicornis*), hoolock gibbon (*Hoolock hoolock*), stump-tailed macaque (*Macaca arctoides*), capped leaf monkey (*Trachypithecus pileatus*), Asian elephant (*Elephas maximus*), tiger (*Panthera tigris*), clouded leopard (*Neofelis nebulosa*), Asiatic black bear (*Ursus thibetanus*), Sloth Bear (*Melursus ursinus*), Asiatic water buffalo (*Bubalus arnee*), gaur (*Bos gaurus*), swamp deer (*Rucervus duvaucelii*) and of course not to forget the freshwater dolphin, (*Platanista gangetica*).

Methods

The present study was undertaken on 24 December 2011 during 7:00 AM – 11:00 AM in the morning while crossing

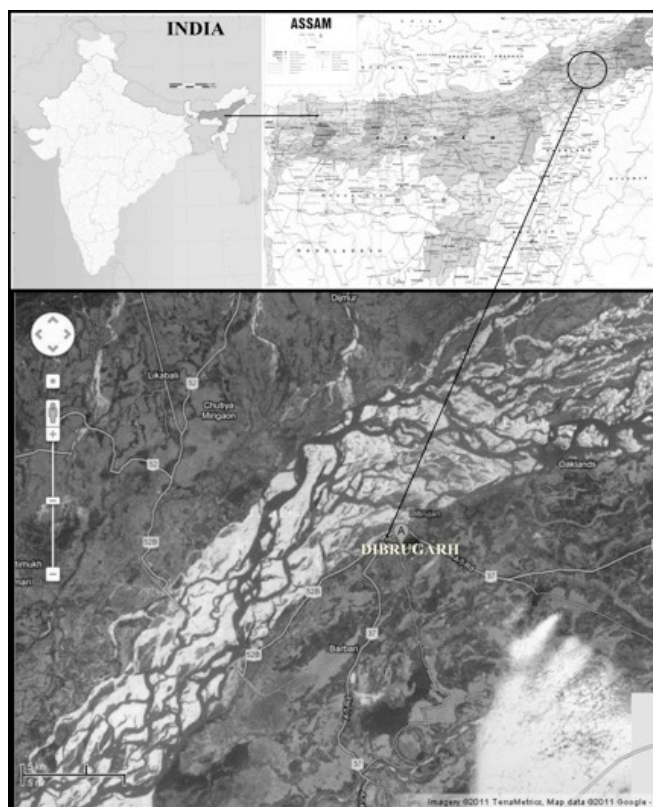


Fig. 1 Map showing study area at Brahmaputra River near Dibrugarh, Assam, India



Fig. 2 Regular ferry service at Brahmaputra River

the Brahmaputra River at Dibrugarh Majarbari Ferry Service from South bank to North bank and on 30 December 2011 during 10:00 AM – 2:00 PM while returning back. Brahmaputra at this stretch is more than 10km wide with numerous small islands, mostly inhabited by extensive grassland patches of *Saccharum spontaneum* and *Tamarix dioica*. The present study area (Figs. 1 & 2) falls within the Upper Dihing (West Block) complex, an Important Bird Area

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Table 1. Birds recorded from Brahmaputra River near Dibrugarh, Assam, India during the last week of December 2011 (R – Resident, W – Winter migrant, P – Passage migrant).

Family	Common Name	Scientific Name	Total Number Recorded	Status
Phalacrocoracidae	Little Cormorant	<i>Phalacrocorax niger</i>	24	R
	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	32	R
Ardeidae	Grey Heron	<i>Ardea cinerea</i>	5	R
	Little Egret	<i>Egretta garzetta</i>	12	R
Ciconiidae	Black Stork	<i>Ciconia nigra</i>	2	W
Anatidae	Rudy Shelduck	<i>Tadorna ferruginea</i>	>1000	W
	Gadwall	<i>Anas strepera</i>	48	W
Accipitridae	Black Kite	<i>Milvus migrans</i>	39	R
Falconidae	Lesser Kestrel	<i>Falco naumanni</i>	1	P
Scolopacidae	Common Sandpiper	<i>Actitis hypoleucos</i>	1	W
Burhinidae	Eurasian Thick-knee	<i>Burhinus oedicnemus</i>	1	R
Alcedinidae	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	3	R
	Crested Kingfisher	<i>Megaceryle lugubris</i>	4	R
Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	24	R
	Bronzed Drongo	<i>Dicrurus aeneus</i>	7	R
Motacillidae	White Wagtail	<i>Motacilla alba</i>	37	W

(IBA Site Code: IN-AS-45) fulfilling the IBA criteria of A1 and A2.

All birds (sitting on the river beds, perched, swimming and flying) were recorded and identified following Ali (1996), Grimmett *et al.* (1998) and Kazmierczak & Perlo (2000).

Results and Discussion

A total of 16 different bird species belonging to 11 avian families were

recorded during the present study (Table 1). Rudy Shelduck (*Tadorna ferruginea*) was the most abundant among all the birds recorded (Fig. 3). Asian populations of this bird are mostly migratory in nature which migrates to winter at lower latitudinal and altitudinal freshwater or saline water sources, grasslands, marshlands, open steppe, upland plateaus and mountainous regions reaching up to 5000m in Himalayas in India and

South-East Asian countries (BirdLife International 2012). Mazumdar *et al.* (2011) have reported this bird wintering and breeding at high altitude wetland (Tsomgo Ama wetland, altitude 4535m) of Arunachal Pradesh. Rudy Shelduck recorded from the present study were in isolated pairs as well as in small flocks of 50 – 60 ducks resting on the banks, flying or foraging in the river. These flocks again was found to share their feeding areas with small loose groups of Gadwall (*Anas strepera*), also a winter migrant in Indian subcontinent. Other winter migrants recorded from the present study location were Black Stork (*Ciconia nigra*) (Fig. 4), Common Sandpiper (*Actitis hypoleucos*) and White Wagtail (*Motacilla alba*). While wagtails were recorded abundantly (a total of 37 individuals recorded) while only one Common Sandpiper and 2 individuals of Black Stork were recorded during the present study.

A single individual of Lesser Kestrel (*Falco naumanni*) was found perched while crossing a small island. This species is thought to be a passage migrant in India between their breeding grounds in China and Mongolia and their main wintering grounds in Africa (Ali & Ripley 1987). Rest of the avifauna recorded during the present study were residents in nature these comprised Little Cormorant (*Phalacrocorax niger*), Indian Cormorant (*Phalacrocorax fuscicollis*), Grey Heron (*Ardea*



Fig. 3 Rudy Shelduck (*Tadorna ferruginea*) recorded during the present investigation in flocks of 50-60 individuals (3a) and also in isolated pairs (3b).



Fig. 4 Black Stork (*Ciconia nigra*) recorded at the bank of River Brahmaputra during the present investigation.



Fig. 5 Grey Heron (*Ardea cinerea*) recorded during the present study, resting (5a) and foraging (5b).

cinerea), Little Egret (*Egretta garzetta*), Black kite (*Milvus migrans*), Eurasian Thick-knee (*Burhinus oedipnemus*), White-throated Kingfisher (*Halcyon smyrnensis*), Crested Kingfisher (*Megaceryle lugubris*), Black Drongo (*Dicrurus macrocercus*) and Bronzed Drongo (*Dicrurus aeneus*).

The present study was done for a very short period, yet, was very much rewarding so far as the avifaunal diversity is concerned. More intensive studies will definitely enrich our knowledge of avifaunal diversity from this location.

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Isosporan infection in domestic sparrows (*Passer domesticus*)

Nagappa S. Karabasanavar¹ and Padmakar D. Deshpande²

Abstract

Fresh droppings were collected from house sparrows (*Passer domesticus*) and the faecal samples were screened for isosporan oocysts. Upon detailed microscopic examination the prevalence of isosporiasis was found to be 57.14%. Detailed morphological and morphometric analysis oocysts of positive samples revealed *Isospora lacazei* in all the sparrows studied. High prevalence of isosporiasis in house sparrows living in close association with human beings necessitates further studies on its zoonotic transmission as well as source of to other avifauna.

Introduction

Isosporan parasite *Isospora lacazei* is a spurious protozoan that has been reported to affect a wide number of birds (Forrester *et al.*, 1976; Duszynski and Gutierrez 1981; Al-Quraishy and Al-Nasar 2009). Passeriformes in general and house sparrows (*Passer domesticus*) in particular have been found to suffer from this infection. Debate continues on the conclusive nomenclature of isosporan species based on morphology, morphometry, sporulation, epidemiology, etc. albeit species *Isospora passeris* and *Isospora passerum* found in sparrows have been placed considered as *I. lacazei* (Al-Quraishy and Al-Nasar, 2009). In view of limited studies on the epidemiology of isosporiasis in India, the current investigation was planned with the objective of understanding the association of isosporans with domestic sparrows.

Material and methods

Freshly voided faeces were collected (n=70) between 6.00 AM to 9.00 AM from domestic sparrows (*Passer domesticus*) living in and around of Shival of Satara District (Maharashtra). Both white and greenish portions of voided droppings were subjected to direct microscopic examination after emulsifying the contents in sterile distilled water. Further, positive samples were kept for sporulation in a thin layer of 2.5% potassium dichromate solution at room temperature followed by zinc sulphate floatation for detailed microscopic examination. The morphology and morphometry of oocysts was evaluated as per standard references (Duszynski and Gutierrez 1981; Al-Quraishy and Al-Nasar 2009).

Results and Discussion

Of the 70 samples from domestic sparrows living in close proximity with

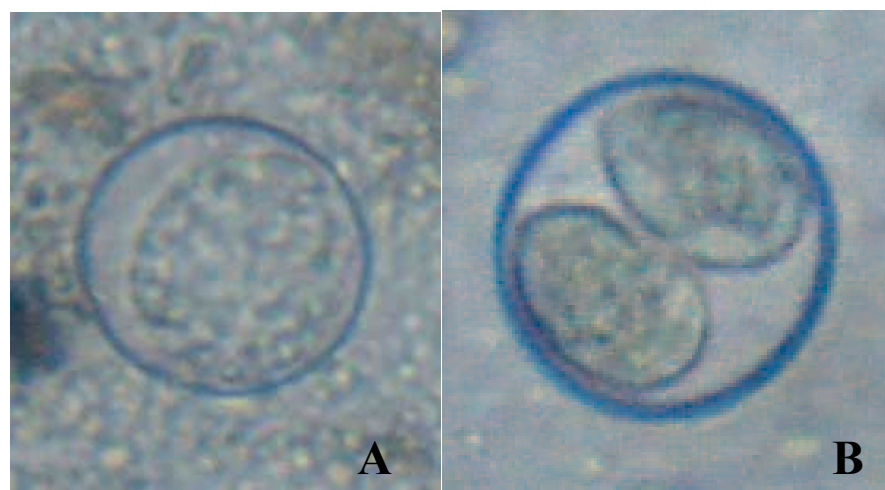


Figure 1: Unsporulated (A) and sporulated (B) oocysts of *Isospora lacazei* recovered from faecal droppings of house sparrows (*Passer domesticus*) [Magnification 40x, Direct microscopic examination]

human that were examined, about 40 birds were found to harbour protozoa belonging to the genus *Isospora* (prevalence 57.14%). The birds harbouring enteric *Isospora lacazei* oocysts (Figure 1) as evidenced by oocysts in their faeces, appeared less active compared to those bright, lustrous sparrows found negative for any oocysts. However, these observations were only qualitative and subjective as the birds were observed from a distance without handling or weighing. Observations continued for a year and revealed neither concomitant mortality nor shrinkage in the size of groups. Further, no variation was noticed in the faecal consistency of either affected or non-affected birds. However, Pinowski *et al.*, (1994) reported effects on development and even mortality of nestlings in birds harbouring isosporans. Similarly, Gill and Paperna (2008) also reported a severe form of Isosporan (previously called *Atoxoplasma*) infection in house sparrows with the overt manifestations of diarrhea, emaciation and death in as many as 70% of birds. In view of scanty information on the Isosporiasis in sparrows in India, a detailed systematic epidemiological study is required on this coccidian protozoan. Current observations made in this study add information on association of *Isospora* with house sparrows without overt clinical manifestations. Further, the carrier status in sparrows is of

significance in the light of potential contamination of water, feed and dwellings of animals or human habitat with oocysts of Isosporans. However, further studies are required to elucidate conclusive nomenclature, transmission mechanisms and potential of infection of human or animals with Isosporans of sparrows.

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A Preliminary Survey of Gastrointestinal Parasitism in Captive Herbivora of Sidhartha Municipal Zoo, Aurangabad

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Introduction

Zoological garden/park is the protected area for wild animal meant for captive breeding, to preserve ever diminishing endangered species. In nature, practically no animal is free from parasitism. When the parasitized animal is brought from wild to captivity, despite quarantine measures, the new condition of zoos is generally unfavorable for the animal but favourable to the parasites.

Although due care is ensured towards feeding, drinking and sanitary condition inside zoo, it is difficult to prevent or eliminate all parasite. Attempts should be made to identify these parasites for successful treatment and control of parasitic infection.

The present investigation was undertaken to know the prevalence and severity of gastro-intestinal parasitism in captive herbivores of Sidhartha Municipal Zoo, Aurangabad.

Material and methods

Random, fresh stool samples (27) were collected at random from 5 each of nilgai, deer, chinkara, sambar, chital and elephants. Examination of stool samples was immediately carried out by direct smear and flotation method as per the techniques of Thienpout (1929) and Georgi (1985).

The samples were examined for the presence of ova of different helminthic parasites. The stool samples were assessed to know severity of infection by estimating EPG (Eggs per Gram) level using Stoll's techniques. The results were then graded into 3 categories viz; below 500, between 500 and 1000 and more than 1000.

Results and discussion

Out of 27 samples examined, 21 (77.78%) were found positive for various parasitic infection. The sample of each species of herbivore was examined as a pooled sample. Among helminthic infection, 19 herbivores (90.47%) were found to be infected with nematode of one species only and 2 (9.52%) were found positive for infection with more than one species of nematodes (Table 1).

Parsani *et al* (2001) found 60% parasitic infection in various captive herbivora at Rajkot Zoo. In similar study, Chauhan *et al* (1973) found 100% parasitic infection in captive herbivores of Delhi and Lucknow Zoo,

Table 1. Species and parasite wise infection in captive herbivores

Name of Animal (Herbivore)	Number of Sample taken	Number of positive found	Type of endoparasitic infection		
			Cestode	Nematode	Trematode
Nilgai	05	05	-	<i>Trichostrongylus</i> spp	-
Deer	05	05	-	<i>Toxocara</i> spp and <i>Trichostrongylus</i> spp	-
Chinkara	05	02	-	<i>Toxocara</i> spp	-
Sambar	05	05	-	<i>Trichostrongylus</i> spp	-
Chital	05	02	-	<i>Trichostrongylus</i> spp	-
Elephant	02	02	-	<i>Oesophagostomum</i> spp	-

Table 2. Species wise EPG level in captive herbivores

Name of Animal (Herbivore)	Number of positive samples	EPG Level		
		< 500	> 500 but less than 1000	> 1000
Nilgai	05	400	900, 600, 700	1100
Deer	05	400	700, 600, 600, 500	-
Chinkara	02	300	500	-
Sambar	05	-	700, 600, 700, 900	1000
Chital	02	400, 300	-	-
Elephant	02	-	800	1100

respectively. Modi *et al* (1997) observed 48% parasitic infection in Bihar zoo in captive herbivore.

Severity of endoparasitic infection was assessed by calculating EPG level. Only 5 animals viz; Nilgai (1), Deer (1), Chinkara (1) and Chital (2) has EPG level below 500 while 13 animals viz; Nilgai(3), Deer (4), Chinkara (1), Sambar (4) and Elephant (1) has EPG level more than 500 but below 1000. Remaining 3 animals viz; Nilgai (1), Sambar (1) and Elephant (1) was found to have levels of EPG more than 1000 (Table 2).

EPG levels of 500 or more demands immediate treatment to the animals and is consider as severe parasitic infection. EPG level detection in various species of herbivore has not been attempted or cited in literature. In order to measure the severity of parasitic infection, EPG level is must and will be helpful in knowing the amount of infection animal is suffering from.

Conclusion

Parasitic infestations cause considerable morbidity and mortality in captive herbivore. Apart from death, especially in young animals, the animals tend to become weak and unthrifty with decreased resistance to other infection. Usually captive

animals do not show alarming sign of parasitism due to routine deworming practices carried out in zoo.

By adopting effective control measure to prevent the possible recurrence of existing infection, we may be able to curb the losses due to parasitic infection.

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A case of total albinism in the Bonnet Macaque *Macaca radiata* (Geoffroy) from Goa

Anil Mahabal, P.D. Rane and S.K. Pati*

In general, the albinism as a phenomenon of the lack of colour pigmentation resulting from the inability to synthesize the melanin and caused by the absence of dominating allele among mammals of India (Smielowski 1987). Further, a condition in which there is a simultaneous complete absence of melanin from eyes, skin, feathers (as in birds, Heimo 2003) and hairs, fur (as in mammals) is categorized as total albinism. Its occurrence in the wild is rare. During the faunistic survey of Goa state in November 2002, we came across a white-albino Bonnet Macaque, *Macaca radiata* (Geoffroy) (Primates: Cercopithecidae) near Valpoi village (Lat. 15° 31' 50.4552" N and Long. 74° 8' 14.652" E, altitude 31m), Sattari Taluka, Northern Goa district.

The macaque was a medium-sized female with total white haired crown and body whereas forehead, ears, fingers of forelimbs and hindlimbs were faint pinkish (Figure 1). The eyes were reddish in colour. The macaque was tied up with a chain to a tree outside a house (Figure 2). When we enquired with the owner of the house, he told that a monkey keeper found it in forested area of Goa (exact place not known) and left her over here. He comes here regularly to offer food and water. Sometimes the owner also offers food to this albino macaque.

While going through the literature, it was noticed that there were number of records of total albinism in mammals of India, for instance Tiger (Gee 1954), Lesser Rat-tailed Bat (Khajuria, 1973), Chital (Singh 1996), Common Palm Civet and Northern Palm Squirrel (Kumar 2004), Five-striped Palm Squirrel (Anil *et al.*, 2005) and Wild Boar (Neginhal 2005).

Total albinism has been reported in the Toque Macaque, *M. sinica* (Linnaeus) from Sri Lanka (Hill, 1933; Fooden 1979), Rhesus Macaque, *M. mulatta* (Zimmermann) from Pratabgarh (South Rajputana) in captivity (Bahadur 1942) and Bonnet Macaque, *M. radiata* from Trivandrum Zoo, South India in 1936 (Hill 1937; Fooden 1981). Further, a captive male Bonnet Macaque with white fur and skin, but with brown irises was observed in London Zoo by Ogilby in 1836 (Fooden 1981), probably a case of incomplete albinism and a pale golden brown sub-adult female with reduced pigmentation was also reported from U.S. National Museum of Natural History, Washington, D.C. (Fooden 1981). Hence, the present report is the second record of total albinism in Bonnet Macaque after nearly seven decades.

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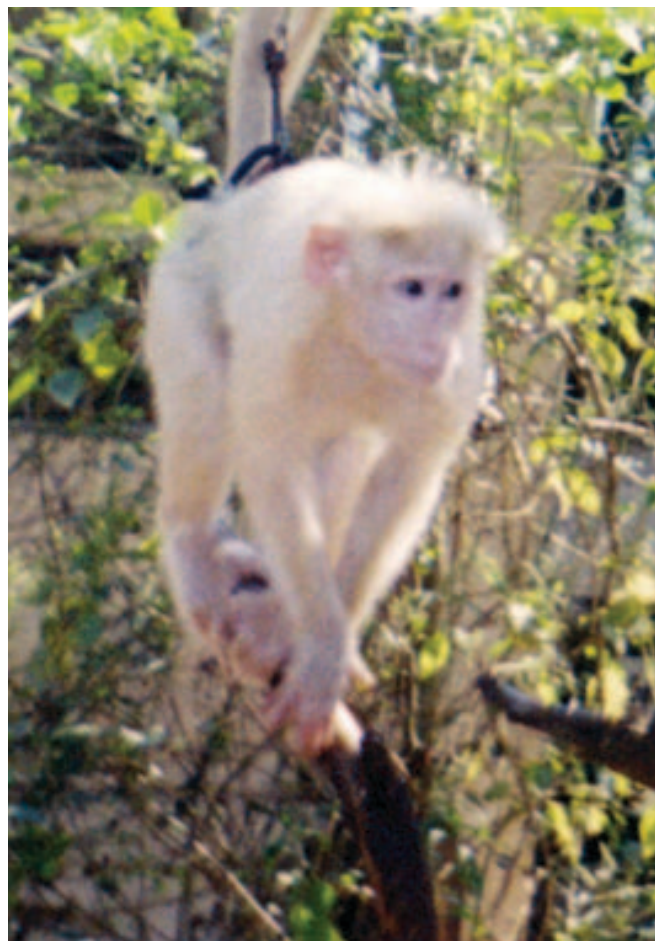


Figure 1. A total white-albino Bonnet Macaque, *Macaca radiata* (Geoffroy) from Goa



Figure 2. The albino macaque tied with a chain to a tree outside a house near Valpoi

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Continued on P. 23

Biodiversity status and conservation strategies with special reference to North-East India by R. Varatharajan*

Book Review by B.A. Daniel

ISBN: 978-81-923343-1-8

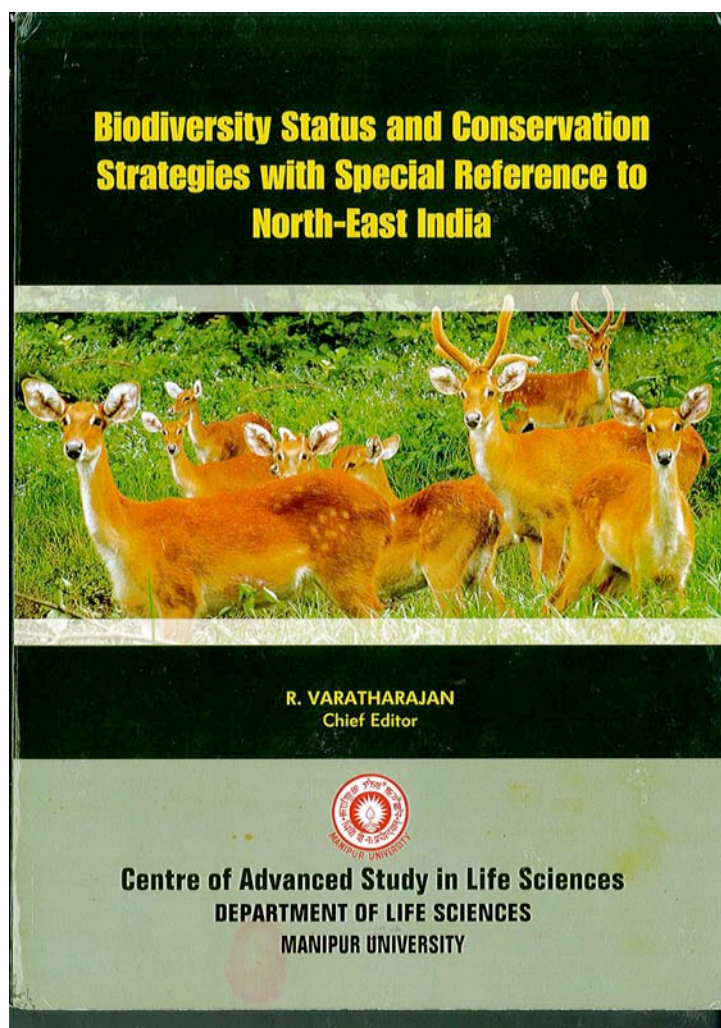
Rs. 1200. (for students Rs. 600).

The proceedings of the symposium on 'Biodiversity Status and Conservation Strategies with Special Reference to North-East India' published in 2012 has addressed several aspects of biodiversity conservation of fauna, flora and ecosystem. This proceedings is the outcome of a symposium that records the occurrence of over 1200 species of plants and animals in North-east India. This publication would be a very useful reference source for researchers, academics and conservation planners.

The proceeding has two sections, 1. Plant and microbial diversity and conservation and 2. Animal diversity and conservation. Including two invited articles, a total of 50 full articles have been included. The invited articles highlight on seaweed biodiversity and conservation contributed by P.V. Subba Rao and an over view of insect biodiversity and climate change by K.G. Sivarakairishnan and C. Selva Kumar.

Articles related to plant diversity of North East India, ethonbotany, traditional knowledge, fungi and ecology are main focus of the section dealing with plant and microbial diversity. Animal diversity includes topics articles related to insect diversity, nematode, rotifers, earthworms and fishes. The volume reveals the richness of this region and airborne fungi, 55 orchids, 52 edible fruits, 50 medicinal plants, 75 each of woody plants, shrubs and herbs, 5 rotifers, 169 nematodes, about 500 insects, and 120 fish species. The authors have enumerated the organisms authentically and focused their status, utility, and conservation strategies wherever possible. Assessment of plant diversity in selected sub tropical forests, National parks, home gardens, and grasslands of North-east India has been highlighted in this publication. Articles related to ethno-botany, cultural aspects and bio-resources like lichens, canes, insects as food, fruits, fishes have been included.

The editor has done a good job in selection of the articles that covers all aspects of biodiversity of North-east India. Some highlighted articles of this



volume are: plants associated with tribe of Manipur, diversity of Sisoroid catfishes, and other fishes of North-east India, extensive plant diversity list of Langol Hills and Kangchup Hills, Manipur and many other articles.

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Distribution of *Hybanthus puberulus* M. Gilbert. (Violaceae) – A new record for Karnataka Parthipan, M. and Rajendran, A.*

Abstract

Hybanthus puberulus M. Gilbert, an Ethiopian species, so far known to occur only in Maruthamalai hills of the Southern Western Ghats, Coimbatore district, Tamil Nadu, India is now discovered from Mysore in Karnataka State in India. In the present study, taxonomic description, distribution, and comparison with allied species of this species are provided.

Introduction

The genus *Hybanthus* Jacq. has about 100 species distributed throughout tropics (Mabberley 2008). In India four species were reported; two of them namely, *H. enneaspermus* (L.) F. Muell. and *H. travancoricus* (Bedd.) Melch. were included in the Flora of India (Banerjee & Pramanik 1993). Among the other two, *H. vatsavayii* C.S. Reddy was described as a new species (Reddy 2001) and *H. stellarioides* (Domin) P.I. Forst., was collected from Hyderabad and described as a new distributional record to India by Ramana *et al.* (2011).

Recently, a species of *Hybanthus* was collected during the floristic studies of Karnataka (Mysore), India. On critical examination and perusal of literature concerning the genus *Hybanthus*, it was identified as *Hybanthus puberulus* M. Gilbert, so far known to occur in Ethiopia (Gilbert 1992). Recently *Hybanthus puberulus* M. Gilbert. was reported as a new record to India in Tamil Nadu (Maruthamalai hills, Coimbatore) (Sasi *et al.*, 2011). The present collection of *Hybanthus puberulus*, therefore forms a new record for Karnataka.

Systematic treatment

Hybanthus puberulus M. Gilbert in *Nord. J. Bot.* 12 (6): 689 - 693. 1992. Sasi *et al.*, in *Zoo's print.* 26 (12). 2011. (Fig 1).

Herbaceous shrubs, much branched, 17–30 cm high; stem green when young, base pinkish woody, hairy. Leaves green above and slightly paler beneath, simple, alternate, clustered at apex, linear to lanceolate, obscurely crenate, mucronate at apex, attenuate at base, hairy, 25 - 35 X 3 - 5 mm; stipules linear - lanceolate, densely hairy, gland tipped, c 2 mm long. Flowers pinkish with darker patterns, solitary, axillary inflorescence; peduncle slender, densely short pubescent, 8 - 10 mm long; pedicel



Fig. 1 *Hybanthus puberulus* M. Gilbert

short, slender, pubescent, 5 - 7 mm long; bracts triangular, densely pubescent, margins ciliate, c 1 mm long; sepals 5, unequal, ovate - lanceolate, pubescent, c 2 mm long; petals 5, unequal, upper pale pink, oblong, 4 - 5 mm long, lateral petals pale pink, oblong ending in a sharp acute apex, c 3 mm long; lower petals pinkish with darker patterns, enlarged, oblong- elliptic, shortly cuspidate, 10 x 6 - 7 mm along with a limb; stamens 5, filaments free, the anterior 2 filaments with hairy appendages, anthers villous, the posterior 3 filaments and stamens glabrous; pistil 3 mm long, style erect and stigma flat.

Capsules 3- angled, short pubescent c 6 mm long; seeds pale yellow, ellipsoid, ribbed, glabrous, c. 3 mm long.

Flowering and fruiting: July–October.

Distribution: Ethiopia (Sidamo region) and now in India from Tamil Nadu (Maruthamalai hills, Coimbatore)

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and Karnataka (Mysore). The few existing records recommend to *Hybanthus puberulus*, is rare and endangered in India.

Ecology: Growing along the Wild forest, especially under bushes, Infrequently found in chasmoendolithophytic (rock crevices) with some cool areas in hills or hill slopes. Some times *Hybanthus puberulus* living associates with rock moist grassy wetland. Fine particles of soil and rock that fill the space among root and rock conditions make good interaction for water flow.

Uses: The attractive flower structure and fascinating pinkish colour can be recommended to grow as an ornamental plant in residents, park and also in rock gardens.

Specimen examined: Karnataka (Mysore), 23 Sep. 2012. Parthipan, M. & Rajendran. A. 156. (BUH).

Conclusion: *Hybanthus puberulus* grows intermingled with *H. enneaspermus* and gives the similar appearance, probably due to this, it might have been overlooked and could not be listed by the earlier workers (Sasi *et al.*, 2011). *Hybanthus puberulus* is closely allied to *H. enneaspermus* but it differs by its dense very short indumentum, which covers all the parts including capsule. In *H. enneaspermus* the indumentum is much laxer, usually longer and the capsule is always glabrous.

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Remembering Francis Day

Francis William Day a world famous ichthyologist of southern Asia was born on 2nd March 1829 at Maresfield in United Kingdom to William and Ann Day. By profession, Day was an assistant surgeon in the then East India Company. In 1852 he was posted to Madras medical service as a surgeon and this marked the beginning of his career in the southern region of the Indian subcontinent. Francis from his early days was very much interested in taxonomical study of fishes and other animals found in India and Indian subcontinent. Day lived for some years in Cochin on the Malabar Coast and this provided him with a unique opportunity to study fishes found along the Malabar Coast. His study really provided an insight into the problems of fisheries and fish supply along the Indian subcontinent. He also travelled extensively and worked on the fishes of Pakistan, Bangladesh, Myanmar and Sri Lanka.

Francis Day contributed immensely to the study of fish taxonomy. In 1864 Francis Day returned to England on leave, carrying sufficient amount of research material. His first research work was published as "The Fishes of Malabar" in 1865. He then returned back to India in 1866 and continued to live in India until 1874. In 1871 he was appointed as Inspector – General of Fisheries in India. Francis Day's publications were followed in 1878 by "The Fishes of India" and then in 1889 with two volumes on fishes as "Fauna of British India". The Fauna of British India contained 1418 fish species taxonomic description in the first volume and about 195 plates of drawing done by him in the second volume. Francis Day was an active member and the president of the Cheltenham Natural Sciences Society. Also the University of Edinburgh awarded Day a honorary LLD. Day retired from British services in 1877. Day was raised to the post of Companion of the Order of the Indian Empire in 1885. He died on 10th July 1889 in

Cheltenham from stomach Cancer.

Until Francis Day nobody had ever extensively studied the freshwater and marine fishes found in the Indian subcontinent. Francis Day has been a very able draftsman which is evident through the unique and splendid collection of watercolours and drawings of India fishes by the great ichthyologist Francis Day himself. Even 123 years after his death students of fishery science and ichthyologists still refer to the publications of Francis Day as ready reckoner in laboratory and on the field for identification of fishes. Thus Francis Day has to be considered as a true ichthyologist and taxonomist for his contribution to the study of fishes of the Indian subcontinent.

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Linking fragmented Biodiversity spots by building Green Corridor along the stretch of the river Yamuna

Natasha Sethi¹ and Saurabh Vashisth²

India is known for its rich heritage of its biological diversity consisting of approximately 91 thousand species of animals and around 45.5 thousand species of plants. The conservation of biodiversity is basic for the sustenance of our life. There are many biodiversity spots in India which need some kind of conservation models along the course of Indian rivers on the priority basis.

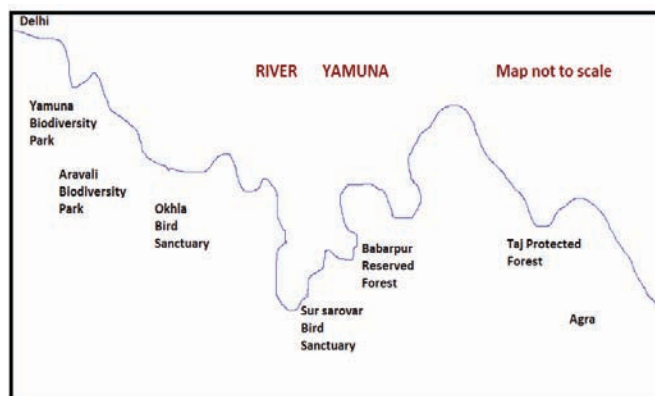
The total length of the river Yamuna is 1376 km and the stretch of river Yamuna from Delhi to Agra is about 235km. The river Yamuna between Delhi and Agra is the worst polluted section of the river showing the seasonal flow of water. In peak summer season the river takes the shape of a drain. This not only affects the total environmental quality of life in that area but the most impact is felt by the animals and vegetations comprising the biodiversity. Thereby river banks have been encroached leaving no space for recharging the river water.

This write up proposes a conservation model leading to sustenance and protection of six (6) biodiversity spots falling under the Yamuna stretch between Delhi and Agra. Six biodiversity spots namely- Yamuna bio diversity park (located near Wazirabad village), Aravali biodiversity park (near Mehrauli-Mahipalpur road), Okhla bird sanctuary (at Okhla near Delhi), Sur Sarovar bird sanctuary (Keetham at Agra-Mathura, NH-2), Babarpur reserve forest (at Agra-Mathura road), and Taj protected forest (Near Taj Mahal in Agra) have been located along the Yamuna stretch.

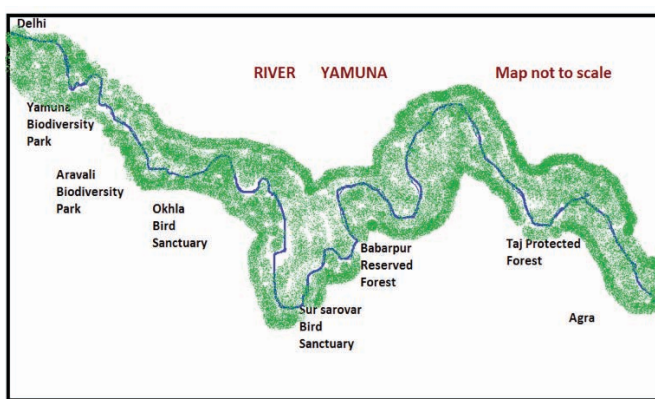
The proposal is an approach to link these fragmented patches through a 50 meter wide green corridor which may enable the exchange and migration between the species living in the respective spots. This will also enhance the existing species of flora and fauna on the bank of river

Six biodiversity spots

Sr. No.	Sites	Present Scenario
1.	Yamuna Biodiversity Park	Located near Wazirabad village herbal garden, sacred grove, butterfly conservatory.
2.	Aravali Biodiversity Park	Located at the Mehrauli - Mahipalpur road, blue bull, butterfly garden, orchidarium, fernery.
3.	Okhla Bird Sanctuary	Located at Okhla near Delhi, shelter to approximately 329 species of birds 2 critically endangered, 9 vulnerable, 7 near threatened species.
4.	Sur Sarovar Bird Sanctuary	Located in keetham at Agra-Mathura NH-2 over 106 species of birds, bear rescue center (SOS) and python point.
5.	Babarpur Reserve Forest	Located at Agra-Mathura road, conserves many species of butterflies.
6.	Taj Protected Forest	Located near Taj Mahal in Agra includes Bulbul, myna, Varanus, blue bull, Hornbill, mongoose etc.



Site Description



Future Scenario

Yamuna. Also the protection from anthropological exploitation takes place. It promotes the holistic approach to conservation, enhancement and sustainable utilization of biodiversity. The other objective includes- enhance the continuous gene flow, reduce the inbreeding depression, prevention of developmental activities along the area of the proposed plan. This Yamuna stretch between Delhi and Agra area is under the flood zone of the river bank so there is no chance for the encroachment and floods can be prevented as well by this model. This model also will influence the hydrological phenomenon such as infiltration and surface flow and helps to conserve endemic, endangered as well as keystone species on the priority basis which is basic to our survival and well being i.e. it maintains the biodiversity at all levels- species level, genetic level and ecosystem level. The expansion of genetic diversity in turn provides lesser vulnerability to diseases and adaptability to environmental changes. This approach also avoids the loss of habitat due to over exploitation of natural resources.

Given the state of conditions of these selected biodiversity spots it appears that model proposed for conservation may be replicated in other areas of urgency for the betterment of our country and mankind.

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Wildlife Week Education Reports

Nethaji Snake Trust celebrate Wildlife week in collaboration with Colleges in Madurai District, TN

NEST conducted two programmes during wildlife week. The first programme was held on 04 October at Thevar College, Usilampatti, Madurai. About 800 students participated. Mr. Balakrishnan, Supt. of Police, Madurai was the chief guest and he spoke about the need to conserve wildlife.

Dr. V. Muruganandan, Principal of the college talked about global warming. Mr. Balasubramaniam, Secretary of the College shared some rare information about the fruit eating bats. Mr. Ravichandran, Forest Ranger described about the Indian Wildlife Protection Act. Mr. Ramesh, Founder of Nethaji Sanke Trust gave detailed information of wildlife and particularly about vultures. Students planted saplings and set up herbal garden at the campus. They all wore the masks and took an oath to save wildlife. Mr. Masanam, President of the college gave vote of thanks.

The second programme on Human Elephant Coexistence was held at Meenakshi Govt. College for Women at Madurai. About 200 students participated. Mrs. Kannambal, Principal inaugurated the programme. Student's pre knowledge on the subject assessed through brain map and attitude assessment. Then, past and present range of Asian elephants through maps, the difference between Asian and African elephants, do's and don't's in elephant areas, dramas on habitat loss and saving fallen elephant from well were conducted. At the end the student's knowledge level increase was assessed by brain map and attitude assessment methods. They all took an oath to coexist with the elephants. Participation certificates were awarded to the students.

Submitted by: P. Ramesh. Email: ramesh_nsrc@yahoo.com

Lucknow University, UP celebrates wildlife week

Department of Zoology celebrated Wildlife Week sponsored by Zoo Outreach Organisation's Educator Network (ZEN), and Regional Science City, Lucknow. It was conducted at Regional Science City involving more than 700 students of class 4-8, High School, Intermediate, as well as Graduate, Post-graduate, N.S.S. (National Service Scheme), N.C.C. (National Cadet Corps), Rover & Rangers (Bharat Scouts & Guides) from about 35 schools, colleges and



Mr. V. Balakrishnan, Supt. of Police addressing in the celebration



Elephants past and present range countries learned through a map activity

Universities of Lucknow. It began with a "Wildlife Awareness Car", flagged off by Mrs. Meena Misra, wife of the Vice Chancellor Prof M.K. Misra. The car was then taken around the Lucknow City by Mr. Nafees Aalam and Mrs. Sheel Tiwari to make aware the public through the distribution of various flyers (turtles, eagles, vulture, sparrows, butterflies, amphibians etc.) During the 7 days 10,000 flyers both in English and Hindi were distributed.

Mr. Neeraj Srivastava, Bird Expert, made a presentation on "World of the Birds" with many interesting bird facts on the first day. Following this a movie "Journey to the amazing caves" was screened. A competition in Wildlife Play for Junior group was organized after that. On 2 October, on the

occasion of birthday of Mahatma Gandhi and Lal Bahadur Shastri, students participated in fancy dress competition, family quiz and logo competition. During the programme, a rakhi tying ceremony was conducted in which the teachers, parents and students tied an animal rakhi to each other and took an oath to protect and conserve wildlife. Zoo Outreach Organisation's Educator Network (ZEN) provided the materials. On 3rd October the students participated in debate and expressed their thought for and against of sea food consumption, a threat to marine biodiversity. There were movies on vultures and Asiatic lions for the audience as well as a very informative lecture by Dr. R.L.Singh, retired PCCF who shared his experiences on wildlife conservation.



Participants posing with the materials received from ZEN

On 4th day a ppt presentation on Wildlife Trade was given. Dr. Ramjee Srivastava, Senior Scientist, U.P. State Biodiversity Board gave a lecture on "Perspective of Climate Change, Biodiversity and Wildlife". He informed students about the biodiversity of the State and major threats to wildlife. On 5 Oct, painting (theme amphibians and reptiles), slogan writing (on wildlife theme) and greeting card making (theme elephants and wild plants) were held with 500 students participation. Movies on Asiatic lions and Gharial were also shown. The students from HAL School presented on the spot skits on vulture, pollinators and bats conservation with the help of awareness materials received from ZOO. Collaborative Art was also an attraction of the day in which an incomplete landscape on board was completed by the participants, teachers as well as judges.

On 6 Oct more than 70 students from different schools and colleges participated in Rangoli competition on the theme Marine biodiversity. The students showed their creativity and reflected their thoughts in their creations. The students visited the wildlife photo exhibition. The school students interacted and learnt a lot from the material in display from Zoo Outreach Organisation, Tamil Nadu as well as Dept. of Zoology, University of Lucknow, Regional Science City and U.P. State Biodiversity Board.

Submitted by: Dr. Amita Kanaujia.
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Vulture awareness programme in Assam school during Wildlife Week

In collaboration with Zoo Outreach Organisation's Educator Network (ZEN) an awareness programme themed

"Vulture Conservation in Assam" was held at Vidyaniketan Govt. High School, Pandu, Guwahati, Assam on 3 October, 2012. Thirty five students of Class VIII participated. The students were described about the theme. The Indian Vulture species have suffered a 99%-97% population decrease in Pakistan and India and between 2000-2007. "Extinction of vultures is a cause of concern. Almost 40 percent of remaining vultures are dying every year," Dr. Asad Rehmani, a senior member of National Board for Wildlife and Director of Bombay Natural History Society (BNHS).

There are 9 species in Indian sub continent and 8 species are found in Assam, out of that 2 are Critically Endangered. Vulture conservation movement in the subcontinent is set to get a boost with Ministry of Environment and Forest (MoEF) expecting 30 young vultures to be released from the Captive Breeding facilities in 3 places (Pinjor, Rajabhatkhawa and Rani) and also marking of vulture safe zones at three places in India by 2014.

The zone between Uttarakhand to Nepal, which spans from Corbett to Katriya Ghat, a Tarai belt, covering 30,000 sq kms, will be earmarked as 'Vulture Safe' zone. Similarly a belt between Dibrugarh (Assam) to North Lakhimpur (Arunachal Pradesh) will also be conserved as a vulture safe zone where slender-billed and white-backed species of vultures are found. The third zone would be in central India, covering Chhattisgarh, where white-backed and long-billed vultures are found.

Slender-billed vulture has a special significance as the species is now



Amity school students performed a skit on wildlife conservation

mainly confined to Assam and has almost disappeared from most of its distribution range in India which was from Himachal Pradesh to Assam. Regarded as the most endangered vulture in the country, only an estimated 1000 birds remain in the wild.

Established in 2007 as a collaborative project of the Assam Forest Department and Bombay Natural History Society, the centre houses 25 White-backed ones and 22 Slender-billed species, most of which were caught from the wild as juveniles. The birds take almost five years to reach adulthood. A nestling each of the white-backed and the slender-billed species have hatched at the centre. Born more than four months ago, the nestlings are healthy now.

Keeping in view the efforts of Assam Forest Department and BNHS for the conservation of vulture in Assam, this education programme has been planned to aware the students for conserving the Gyps vulture from extinction. The education materials on vultures was explained to the students and then distributed. They went through each materials. They tied rakhi with other and holding the placard. They read the flash cards. I want to thank Zoo Outreach Organisation for providing the vulture education materials. **Submitted by: Ms. Arpita Das, Assistant Science Teacher. Email: arpitadas_ghy@yahoo.co.in**

Wildlife Week at Sundarvan, Ahmedabad, Gujarat

Sundarvan designed and conducted activities for different walk of people during wildlife week. A bat awareness programme for general public was arranged on 1 October. The education materials received from Zoo Outreach Organisation (ZOO) was used during the occasion to enhance our regular activities. Activities such as painting, quiz and elocution were conducted for school kids on 2 Oct. Gift vouchers to take part in Sundarvan's camps were given to top three candidates in each category. A half-a-day reptile awareness workshop was carried out on 3 Oct. School teachers and other interested people attended this programme.

Members and friends of Navgujarat Multicourse Training Institute under the guidance of Mr. Ketan Modi, displayed their photographs on 4th and 5th and Mr. Nirav Bhatt, Savannah Nature Conservation Society, displayed his photographs on 6th and 7th in the Sundarvan premises. The photographers generously provided



Govt. High School, Assam students with vulture placard committing for vulture conservation

their photographs free of cost purely in sake of creating awareness on nature conservation. A workshop on basic photography by Mr. Ketan Modi and one on birds by Mr. Maynk Ghadi were conducted for interested people on 4th and 5th respectively. A reptile awareness workshop was conducted for students of a reputed college from Ahmedabad in the park premises on 6th, where more than 300 students participated.

A one day filed outing to Hingolghad and Lothal was arranged for general public on 7th. Apart from regular activities, importance of pollinators was explained to the participants using the education materials supplied by ZOO. **Submitted by: S. Sivakumar,**

Shivbhadrasinh Jadeja, and Rajendrasinh Jadeja. Email: wildlifessiva2050@gmail.com

Wildlife Week Celebration at Maharaja Ganga Singh University, Bikaner, Rajasthan

The wildlife week-2012 organized by Dept. Env. Science was inaugurated by Prof. A.K. Gehlot, Vice Chancellor of Rajasthan Veterinary University, Bikaner on the 1 October, 2012. Prof. M.M. Saxena, Dean and Dr. Meera Srivastava, Head, Department Zoology, Doongar College gave their views on the role and responsibilities of academicians in the education and awareness for wildlife involving the youth in wildlife conservation researches and studies. Dr. Pratap



School kids are learning about insect pollinations during field visit

Singh, Department Zoology, Doongar College, Bikaner presented a lecture on the "status of wildlife including mammals, birds and reptiles". About 90 students of Maharaja Ganga Singh University and other colleges participated in the poster competition, on the subject "Wildlife Conservation".

Participants visited the animal museum and plant herbarium of Government Doongar College, Bikaner on the second day. They were given detailed information about animal collection, preservation, and science of taxidermy, insect collection and preservation and herbarium sheet preparation by the staff of the colleges. Prof. G. R. Jakher, VC, MGS University, presented a lecture and film showed on "The Herbivores of the Thar Desert" on the third day. Then Dr. Anil Kumar Chhangani showed documentaries on vultures and Hanuman langurs social behaviors and also gave a lecture on the status of vultures in Rajasthan. Elocution competition on the topic "Wildlife Conservation" was organised 4 day in which 19 students participated. After this, education and awareness materials provided by the Zoo Outreach Organisation were explained its importance and distributed. On the 5-day, all the participants visited Jorbeer, a Protected Area near Bikaner. During the visit participants were given practical trainings for the field methods of floral and faunal surveys, population estimation, identification, etc. Use of the field equipment like Binoculars, Digital and SLR cameras, video

camera, camera traps, digital voice recording, Global Positioning System, reading of maps and toposheets, etc. Field training about the vegetation survey methods and plant species identification, collection and preparation of herbarium training in the field itself by Dr. Anil Kumar Chhangani, Dr. Rajaram Choyal, Dr. Leela Kaur and Dr. Prabhu Dan Charan. After the training the participants were divided in to teams and given various field exercises like, measurement, estimation and identification of floral and faunal diversity of the Jorbeer. This field visit was also joined by people from press and media headed by Shri Yogesh Sain, Chief Sub-editor, Rajasthan Patrka, Bikaner.

Day six and seven, the trained participants were sent in small teams to various schools and colleges of Bikaner city and also the places where children who do not go to school. They organized wildlife awareness programs through play, talk in local language and distributed the various education and awareness material provided by Zoo Outreach Organisation. All the participants were given certificates and winners of the various competitions awarded with the prizes. **Submitted by: Dr. Anil Kumar Chhangani. Email: chhanganiak@yahoo.com.**

BCF, Trichy celebrate Wildlife Week in Sathyamangalam, Nagapattinam & Trichy Dt. of Tamil Nadu
Biodiversity Conservation Foundation (BCF), a NGO based at Trichy,

celebrated this week and achieved the goal of this week through four different programs based at Sathyamangalam, Nagapattinam and Trichy. Wildlife photography exhibition was conducted in all three places to display the rare vignettes of wildlife ambience. Special Wildlife Week training programme was organized in collaboration with Tamil Nadu Police Department for Special Task Force (STF) on 1 October. Dr. A.Kumaraguru, followed by a discussion on "role of forensic science in wildlife crime" with the STF delivered a special lecture on "Biodiversity conservation". The importance of conservation was explained through the information booklet on Daily life Wildlife provided by ZOO.

Another programme was conducted at Sathyamangalam to address people of Bhavanisagar range with TamilNadu Forest Department (TNFD) collaboration on 2 October. People working and travelling across this forest range for their daily activities were contacted to create awareness on the importance of wildlife and its conservation through WLPE with a theme of animal welfare. We also distributed information pamphlets on role of plastics in global warming and the importance to avoid plastics bags and plastic dumping at the forest ecosystem to the people of peripheral villages. Wildlife week was celebrated at Nagapattinam on 9th Oct. with the support of TNFD, Nagapattinam and held at collectorate. Mrs.Asiya Mariam, Collector (in-charge) of Nagapattinam



Dr. Meera Srivastava explains about the insect collection and preservation at Doongar College



Dr. A. Kumaraguru, BCF with blow-up pollinator poster

district, District Chief Education Officer and TNFD headed by DFO, S.Ramasubramaniam IFS. More than 300 students and government officials witnessed the wildlife photographic exhibition themed "green landscape". BCF pamphlets pictorially represented the benefits of planting trees which extends the green cover of our country and reduces the impact of global warming. The documentary on bird migration and importance of conservation of Green turtle and mangrove flora at Point Calimere portrayed the importance of conservation of the green flora of this ecosystem.

TNFD, Trichy which has extended their support to conduct the wildlife week celebration exclusively for four days (October 10-13, 2012) at Poomalai Commercial complex, Trichy. Along with our photo exhibition we displayed the importance of pollinators (supported by ZOO) and global warming. Mrs. Jayashree Muralidharan, Collector of Trichy, inaugurated the wildlife photo exhibition and the documentary session on wildlife was inaugurated by Mr. Balamurugan, Regional Passport Officer, Trichy. The documentaries on tigers and wildlife conservation provided us with an easy way to reach people. District Forest Officer, Mr. Anwardeen, IFS, had encouraged and provided necessary support for special lectures every day by BCF

members. The topics addressed during the programme are "Biodiversity" and "Biodiversity Conservation and Role of Forensic Science" by Dr. A. Kumaraguru, Wildlife and its ecosystem" by T. Brinda, Scientist, "Wildlife Management – *in-situ* and *ex-situ* conservation" by Dr. U. Lakshmikanthan, Cryopreservation, scientist, BCF and "Biodiversity Conservation and Role of Forensic Science" by Dr. A. Kumaraguru, which is exclusively arranged for various levels of TNFD officials.

The theme of pollinators was focused to create awareness among students and people of the importance of pollinators in an ecosystem. However, tigers, lion and other charismatic species attract much attention from the government as well as field biologists during the Wildlife Week. But there are other species that are indispensable for the fragile ecosystems. And there are other species on the verge of extinction or endangered and also as important as tigers for the balance of ecosystems. Other animals, which are significant in an ecosystem, are pollinators, which include several fauna such as bats, butterflies, garden lizard, birds, monkeys, beetles and squirrels. The exhibition has been visited by more than 350 people mainly families along with their kids. Interactive sessions with them helped us to disseminate the importance of wildlife and to educate them that the key global wildlife conservation in the 21st century will be to craft solutions that meet the integrated ecosystem approach.

BCF expresses its sincere thanks to TNFD of Sathyamangalam, Nagapattinam and Trichy divisions who have approved our requests and supported us in immense ways in fulfilling our mission well. Our special thanks go to Mr. B. Rathinasabapathy who kindled our interest for this awareness programme. BCF thanks Zoo Outreach Organisation, SAsISG, UFAW and Columbus Zoo and Aquarium for the education materials. **Submitted by: Dr. A. Kumaraguru. bioconserve2010@gmail.com.**

Wildlife Week celebrations in Chennai schools, Tamil Nadu

Three conservation education awareness programmes were conducted during wildlife week on the theme daily life wildlife, pollinators and bats with the materials received from Zoo Outreach Organisation.



Forest tribal watchers of Sathyamangalam are looking at the photo exhibition

Daily life Wildlife: Forty Eco club teacher co-coordinators belonging to 3 Govt, 11 Corporation and 26 Government aided schools of Chennai observed Wildlife Week at Jai Gopal Garodia Govt GHSS, Saidapet Chennai. Mr. Pitchaimuthu, District Eco Club Coordinator welcomed and introduced the resource person Mrs. Jessie Jeyakaran to the participants. The program began with the introductory talk on wildlife along with explanation of the technical assistance agencies like ZOO and WILD. Chances were given to the teachers who are going to retire in near future to distribute the booklets supplied by ZOO Outreach Organization. With smiles the participants looked into the nine pictures of animals and few started to mention their names. After explaining the difference between wildlife and captive wildlife the title created by ZOO i.e., Daily Life Wildlife was explained. With much enthusiasm the participants tied up the head band. Few colored the pictures too. Secondly ABC of Wildlife was dealt with. They were excited to know about bat, bear, frog, rodent and invertebrates. Participants really felt the cruelty done to these little creatures and appreciated the ZOO, India for their efforts besides extending thanks to ZOO and WILD. Finally they turned into little kids by looking into the invertebrate stamp album and started to paste, while majority liked their Eco club students to take this activity. They also thanked ZOO for the pictures of different types of eyes in the last page as it will be very useful when they see any animal at home, school and in the public places. All were instructed to carry out the program within three days to the Eco club students of the respective schools. Glad to inform that ZOO's effort is not in vain, because we are receiving the reports from the teacher participants. The speed with which they have carried out the follow up shows the value of the effort taken by the director and the ZOO's crew besides WILD

Pollinators: The second programme was held at Ebbas GR. HSS Chennai for about forty students of class 8 and their teachers on Pollinators on 9 Oct. 2012. Mrs. Jasmine Daniel, Head Mistress gave the welcome address. After the introductory talk on wildlife week, the booklets were distributed. Brightened were the students' faces, while they looked at the pictures on a bright white paper. With an uncontrolled voice they showed the bats, monkey and gecko pictures to one another. Mrs. Jessie Jeyakaran briefed about ZOO and Columbus Zoo and Aquarium USA and South Asian Invertebrate Specialist Group. On having the tag on pollinators-Save all Our Lives!!! They came to know the best pollinator is BEES. Their postures changed when they hold the placard with primates are also pollinators. They tied up the head band-pollinators came in all species, sizes, shapes



Students are looking out for pollinators at the school campus



Fruit bat cards are displayed by the students

and shades to each other happily. The details about the pollinator, their importance, kinds, and their decline in number were explained. The percentage of pollinators in the world has kindled their minds. The students collected their experience during bees and wasp bites and concluded that their sufferings at that particular time are nullified when compared to the benefits of this little creature. No Pollinators-No Plants-No Food-No Survival-this has turned into the thought for the day. There was a role-play with tag, bees-flower-honey besides a drawing competition. The winners were awarded with pictures. The students were divided into four groups to identify the pollinators in the campus. A follow up of data collection on pollinators in the campus during different months in different areas was given. All the participants and teachers filled with new experience departed to decentralize the days experience to others.

Bats: On 10 Oct. nearly 220 students of standard VIII in Montfort Mt. HSS Chennai celebrated wildlife week on the theme Bats in the International Year of Bat. Bro. KN Thomas, The Correspondent's inspiring speech on wildlife, Mrs. Jessie Jeyakaran's introductory talk and the distribution of educational kit by Bro. Arul Deeparaj, The Principal and Mr. Paul Jeyakaran. The students divided into four groups and each group taken each activity such as tying of rakhi, holding the placard, learning from the bookmark and reading the truth and untruth of Bat. Pictures on the cover had leaded them by self-learning. Participants were excited to know about the insectivorous and frugivorous bats. The 180 observers learnt a lot from the students. Elucidatory questions were asked at the end. The role play with the mask of family members Govt and forest officials add the real spirit. Identification of the bat pollinators from the fruit bat was very interesting. The drawing sheets and the clay model have thrown new knowledge to the onlookers. Students given their feed back at the end and they says: very informative; interesting and entertaining; excellent gifts with the pictures of bat; the assumptions about bat (wild, bad) are erased from my mind; wish to spread the news; on the spot questioning about the bat was appreciated; very proud to be a part of ZOO, India. The Principal distributed the gifts (post card, sticker with bat) to the winners of drawing clay model and on the spot answering. Ms. Susan and Ms. Nancy the teacher coordinators shared this to 106 science club students and 105 eco club students in the same week. Ms. Kanthimathi the reporter from The Hindu witnessed the entire program for publishing in the daily. **Submitted by: Mrs. Jessie Jeyakaran. Email: jessiejey@rediffmail.com**

ZOO'S PRINT

Magazine of Zoo Outreach Organisation

ZOO's PRINT Publication Guidelines

We welcome articles from the conservation community of all SAARC countries, including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka and other tropical countries if relevant to SAARC countries' problems and potential.

Type — Articles of semi-scientific or technical nature. News, notes, announcements of interest to conservation community and personal opinion pieces.

Feature articles — articles of a conjectural nature — opinions, theoretical, subjective.

Case reports: case studies or notes, short factual reports and descriptions.

News and announcements — short items of news or announcements of interest to zoo and wildlife community

Cartoons, puzzles, crossword and stories

Subject matter: Captive breeding, (wild) animal husbandry and management, wildlife management, field notes, conservation biology, population dynamics, population genetics, conservation education and interpretation, wild animal welfare, conservation of flora, natural history and history of zoos. Articles on rare breeds of domestic animals are also considered.

Source: Zoos, breeding facilities, holding facilities, rescue centres, research institutes, wildlife departments, wildlife protected areas, bioparks, conservation centres, botanic gardens, museums, universities, etc. Individuals interested in conservation with information and opinions to share can submit articles ZOOS' PRINT magazine.

Manuscript requirements:

Articles should be typed into a Word format and emailed to zooreach@zooreach.org. Avoid indents, all caps or any other fancy typesetting. You may send photos, illustrations, tables.

Articles which should contain citations should follow this guideline: a bibliography organized alphabetically and containing all details referred in the following style: surname, initial(s), year, title of the article, name of journal, volume, number, pages.

Editorial details:

Articles will be edited without consultation unless previously requested by the authors in writing. Authors should inform editors if the article has been published or submitted elsewhere for publication.

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ZOOS' PRINT magazine is informal and newsy as opposed to a scientific publication. ZOOS' PRINT magazine sometimes includes semi-scientific and technical articles which are reviewed only for factual errors, not peer-reviewed.

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