SAZARC : Sixth Annual Conference Coimbatore 2006 --

Participant Presentations

In SAZARC meetings, participants were asked to prepare a presentation about their zoo, an overview, a problem, a project or issue. Presentations have been summarised here.

The Benefits of SAZARC for Karachi's Zoos, Pakistan

M. M. Qazi *

Since the birth of SAZARC in the year 2000 we met six times at different Conferences and Workshops organized by the SAZARC. In these conferences we gained so many techniques, experiences from personal observations and visits to different organizations of our region. These conferences and workshops provided opportunities to discuss our problems and views with each other and find out their solutions.

In SAZARC conferences, a major role is played by the resource persons for training. Their lectures, notes and materials has been imparting a great amount of knowledge and experience to the participants. The following technique for remembering basic principles of zoo management was provided by Dr. Miranda Stevenson, Director, British and Irish Association of Zoos and Aquariums in our meeting in Dhaka, Bangladesh in 2002.

C.A.R.E.R

The modern zoo is a "carer" – supports 5 pillars.
C- conservation
– *in situ* and *ex situ* sustaining of wild populations
A- animal welfare
– to insure animals' comfort, health and well-being
R- recreation
– to attract and engage public
E- education
– to educate public about conservation values
R- research
– into behaviour & biology of wildlife

Conservation:
SAZARC has totally changed the concepts of zoo management in many of our South Asian Zoos. Earlier we conceived that animal exhibition and animal breeding were the only zoo management. Through the conferences & workshops of SAZARC, aided by ZOO, WILD and their networks, however, we have been able to understand that endemic species need priority consideration instead of exotic ones.

Even among the endemic species the most threatened ones need to be treated or considered first. In the beginning our Karachi Zoo had small number of endemic species. Later on we exchanged our surplus stocks of endemics with local zoos and wildlife agencies of the country. At present we have 53 species of endemic Mammals, Birds and Reptiles, and now by breeding these species we have taken a step forward in the conservation of endemic species: -

Population Management.
In Zoos & Safaris proper population management is a key to success.

The zoos with larger population of a species are faced with numerous unmanageable problems, which causes negative effect on the animals, i.e. malnutrition, spread of diseases, mortalities, criticism from public and media besides economic strain. With a view to achieving this objective, we are trying to control population of our animal species by taking the following steps: -

By restricting breeding in some species through medication and different techniques.
By segregation of mature males from females.
By disposing of surplus stocks through exchange between zoos within and outside the country.

Species Management.
Now we are trying to concentrate on the species, which have more conservation value. We have fixed our priorities among the following species: -
1. Core Conservation species.
2. Conservation species.
3. Educational species.
4. Research species.
5. Exhibition/ Display species.

We have also taken measures to avoid inbreeding through animal exchange programmes between zoos of the country and regions because we know due to inbreeding the animals will face the problems of infertility, still births, deformities, genetic and enzymatic diseases.

We have also discouraged hybridization in our zoo animals because they have no conservation value.

Animal Welfare.
Animal welfare is most essential requirement in a zoo, for which the following five freedoms are crucial :

The Five Freedoms of Animal Welfare
1. Freedom from thirst, hunger and malnutrition:
By ready access to fresh water and a diet to maintain full health and vigour.
2. Freedom from discomfort:
By providing a suitable environment including shelter and a comfortable resting area.
3. Freedom from pain, injury and disease:
By prevention or rapid diagnosis and treatment.
4. Freedom to express most normal behavior.
By providing sufficient space, proper facilities and company of the animals and treatment.
5. Freedom from fear and distress.
By ensuring conditions which avoid mental suffering.

*** Director, Karachi Zoo, Karachi, Pakistan**

Nutrition

Karachi Zoo took the following measures in the light of Ellens & Miranda lectures:-

Browses — We started giving foliage or browses to herbivores.

Calcium and Phosphorus — We started calcium & phosphorus especially among carnivores.

In flightless birds — We changed the diet articles from grains to lucern for ostriches & other flightless birds.

Vitamins and Supplements — also concentrated on the use of vitamins & supplements in animals.

Carrots and Sunflower — Contain carotenoids to enhance the pigmentation in flamingos

Habitat Development :

For the survival of any species natural habitat is very much essential. It was learnt through SAZARC conferences that the natural material like logs, stones, bamboos, rock along with natural vegetation can help improve the habitat of an enclosure where animals feel free from trouble or anxiety. We started raising vegetation along the fencing, within and around the cages. With a view to improving environmental conditions, inspired by the lectures of Mr. Adit Pal on enclosure designing, we also added natural materials like stone, rock, wood and bamboo in cages to provide a natural effect to the animals. We have got the wall, stone pitched. In some cages we have also used palm trunks after slicing into two parts being wise and carving out for planting creepers.

Screening — We undertook screening of fences, bars and structural material with natural material and vegetation, so that animal may feel nearest to the natural environment. In the Safari Park by using logs and vegetation we created a forest-like effect, which reduced the incidents of fights among the animals. This also made the access of the visitors limited to the animal. The animals do not get disturbed and enjoy comfortable and normal life.

Log Stacking — I had noticed logs stacking within the cages of herbivore animals during the visit of Kathmandu Zoo, Nepal. We adopted this practice in our zoo & stacked logs within herbivore cages. This ensured the safely of male fawns & calves from other mature males of the herd. In summer & rainy seasons it also provides shelter to the youngones.

Vegetation Zones — In order to improve vegetation within Safari enclosures as inspired by Mr. Adit Pal, we constructed vegetation zones in our Safari Park. These vegetation zones also provide foliage or browsers for the animals, which contains different ingredients good for the health of animals. These zones also serve as air filters for the cages by librating O_2 & absorbing CO_2. In some areas where roads are very near to the enclosures these zones serve to control the noise & smoke pollution.

Creepers — We raised different type of creepers in some cages to protect the animals from high temperature & help them feel comfortable in the summer. This has yielded very good results.

Pheasantry — The different techniques and experiences learnt through presentations during the meetings of SAZARC were successfully applied at our Karachi Zoo especially in our pheasantry, reptile house and in carnivore cages. In pheasantry cages we used shrubs, herbs & ferns to provide them natural vegetative cover, which provides lot of insects to the birds keep them busy eating the insects for the whole day.

Reptile House — We have a good reptile house in which 200 species are housed and inside we planted desert plants as well as small shady shrubs.

Veterinary facilities — At Karachi Zoo we have a veterinary hospital, fully equipped with operation theatre, quarantine X ray unit & a small laboratory. We have also a panel of Veterinary experts at our disposal for getting expert advice & sometimes for conducting operations.

After affiliation with SAZARC we are now in touch with SAZARC zoo community. We can now discuss our veterinary problems with our colleague. For instance last year we discussed some of our carnivore and tortoise problems with Dr. Sahu and thus resolved them successfully. Similarly in the recent past our female elephant developed some joint problem and after medical advice of Dr. Jayanthi we treated the animal and it is now quite right.

ZOOS' PRINT and ZOO ZEN.

We are thankful to Madam Sally Walker the Patron of SAZARC who has been sending us Zoos Print and Zoo Zen, wherein the problems and their resolutions regarding the Zoo animals are discussed, and have proved to be very helpful instructor for the improvement of our Karachi Zoo & Safari Park.

SAZARC Veterinary Committee

As we all know SAZARC had constituted a veterinary committee at a conference in Malaysia, which is identifying new medicines for the treatment of wild or zoo animals & their source of procurement. The said committee submits its reports in each conference, which also, helps us treating our zoo animals in a better way.

Educational Activities

We arrange following different educational activities or programs to motivate school age groups. Through these programs we impart education & awareness about the conservation, behaviour, habits and habitats of different animal groups: such as animal birthdays, poster competition, touch table and slide shows.

Research

Recently with the collaboration of SAZARC two workshops were arranged in Karachi Zoo, regarding Zoo Management and Techniques to handle small mammals. Due to SAZARC not only the scholars of wildlife member countries meet with each other once in a year but they are also playing a vital role in conservation of wildlife resources of the region.

The member countries through these conferences and workshops of SAZARC come close to each other cooperate and coordinate with each other, which is a sign of success for the whole region. I express my heartfelt thanks to SAZARC, Madam Sally Walker for providing this precious wealth of information through these conferences and workshops.

Daily Routine of Pinnawala Elephant Orphanage

Lasantha Dileep Kumara*

Elephant orphanage is the conservation and captive breeding center for Asian Elephants. It's daily routine provide

— Natural condition for the herd of elephants to behave like in wild.
— Maximum opportunity for visitors to observe elephants.

Daily routine consists of free land activities, feeding, resting and bathing

Free land activities –
1) Elephants are free roaming in the morning 08.00 –10.00 and in the afternoon 12.00 –14.00
2) Bathing Pool — Bath and enjoy whenever necessary.
3) Formation of social groups in free land Leader of the herd is *Mathalee* who is a good leader and a good mother, and an excellent grandmother.
4) Playing — calves play with each other
5) Grazing — feed on grasses
6) Allomothering — in which mothers and grand mothers pet the calves.
7) Animal welfare — Vet surgeons examine elephants in free land for dangerous objects, etc. and give special attention to disabled elephants, e.g. '*Raja*' - a blind tusker, '*Sama'* - a victim of the war, '*Pandu*' - left ear eaten by a leopard

Curators role in the daily activities is to observe elephants behaviour and feeding. They also take care of record keeping and inform the Veterinarian about sickness. They check the quality and quantity of feeds. They are responsible for cleanliness of the sheds. They also check the maintenance of forest patches, garden and pathways.

Bathing — The elephants walk to the river in a parade and enjoy the river in the mornings and in the afternoons. They enjoy mud bathing.

Feeding — the orphan babies are bottle fed with 'Lactogen 2' milk powder In the morning 9.15 –9.45 hrs and in the afternoon 13.15 – 13.45 hrs. In a select week elephants and pregnant elephants are given artificial mixture of vitamins and minerals at 12 noon. Other elephants are provided some foliage when they are in the free land and when they are in the sheds, coconut trunk, kitul, mixed leaves etc are given as foliage.

Resting — At about 4 O' clock all elephants are taken to their sheds.

* **Curator, Pinnawala Elephant Orphanage, Sri Lanka.**

Assam State Zoo & Botanical Garden – the green lungs of Guwahati City

Sonali Ghosh*

The Assam Zoo was established in 1957 on an area of 175 ha of undulating hillocks, 4 water bodies and lush greenery of Hengrabari Reserve Forests. The zoo has over 586 animals of 87 species. The Botanical Garden was established in 1982 houses over 600 plant species, of which 2 plant species are under schedule VI. More than 37 species are included in Wildlife (Protection) Act, 1972 Schedule I and Schedule II Part II. Our team consists of a DFO-ACF-R.O (2)- FVO-A.E-Botanist-Head Animal Keepers-Animal Keepers. The zoo gets over 5 lakh visitors and Rs.50 lakh revenue annually.

2005 Activities
Captive breeding initiatives were undertaken in Rhinoceros, Golden Langur, Hoolock Gibbon, Slow Loris, Serow, and Tiger. Complete enumeration and computerisation of Inventory and Stud Book compilation was done. Composite enclosures were put together (otters, turtles, Chinese Pangolins, Golden Langurs together).

The following programme were established : Adopt an animal scheme, animal talk, animal keeper training for NE zoos, animal exchange (Delhi, Shillong zoo), health monitoring protocol (zoo captives and humans), vaccination, sanitation and disinfection schedule, computerization of diet chart and introduction of feed supplements, bilingual signages with up to-date information, corporate sponsorships, completion of new enclosures based on CZA guidelines, hospital building, staff training, children's camp, rescue and rehabilitation of 19 Burmese rock pythons and short term research studies (animal behaviour, visitor satisfaction, zoonotic diseases).

Challenges to be overcome
Captive breeding, overbreeding, TB, obesity, imprinting and stereotyping, food and enclosure enrichment, stray rhesus, database management (esp for adult unknown animals), funds for maintenance and recurring costs, shifting of animals in transit, fate of rescued animals (e.g.leopards), staff motivation, age and literacy levels, recruitment of animal keepers, visitor education and management, long term research.

*** ACF, Assam State Zoo and Botanical Garden, Guwahati , Assam**

Conservation Scenario in Andaman & Nicobar Islands

K. Ravichandran *

Andaman and Nicobar Islands cover a total area of 8249 sq. km and a recorded forest area 7171 of sq. km; 87 % of forest area intact and only 0.815% of forest is disturbed; 0.5% of the forest area under encroachment.

Plant Diversity includes 2500 species of flowering plants of which 14% are endemic and 40% are non-endemic. About 40 species are extremely localised and 50 species have been collected only one.

Animal Diversity includes a reported 5100 species of which the following numbers are endemic to Andamans and Nicobar Islands : 53 species mammals of which 33 are endemic, 244 species of birds of which 106 are endemic, 76 species of reptiles of which 24 are endemic, 189 coral species.

In terms of biodiversity assessment, monitoring & conservation of which there are 9 National Parks, 96 Sanctuaries, 1608 Sq.km (22%). Now 3150 Sq.Km forest area set aside as Tribal Reserve. There is biodiversity characterization at landscape level and bioprospecting for medicinal plants. The government of the islands has a biodiversity strategy and action plan of which the strategies for *insitu* conservation are PA management, enumeration of biodiversity, containmant of threats to particular taxa, elimination of threats due to introduced species and introduction of alternative renewables

Ex situ conservation of Andamans and Nicobar Islands consists of a biological park, botanical garden, an arboretum, seed banks, gene banks and a mini zoo which was stablished in 1967 to showcase the faunal wealth of A&N Islands. There is a programme for education & awareness. The zoo stock consists of 14 species. There is captive breeding of Salt water Crocodile, Malayan box turtle and Crab eating macaque. The zoo has an established veterinary unit, and a committee for health care and feeding of zoo animals.

Chidyatapu Biological Park was approved by a Wildlife Advisory Committee in 1989. It has an area of 100 acres located in a reserve forest block which includes tropical moist deciduous, semi evergreen, evergreen and littoral forests, one of the endemic bird areas in A&N Islands identified by Bird life International.

*** DCF, WL Division, Haddo, Port Blair, Andamans**

KMTNC/Central Zoo Celebrates Tenth Year under modern management

R. K. Shreshta*

The current zoo was established originally in 1932 A.D. by late PM Juddha SJB Rana as a private zoo. After the political change in 1951, the ownership of the central zoo came under the HMG Nepal. The zoo was opened to the public in 1956. The management of central zoo formally was handed over to King Mahendra Trust for Nature Conservation (KMTNC) for 30 years on the occasion of golden jubilee of the late kings' auspicious birthday.

The central zoo is six hectares in area and has over 1000 individual animals of 121 species. It has been managed by KMTNC since 1995, gaining positive response from people in–house and abroad. The central zoo also has been marching towards self sustainable economy since 2001.

The objectives of the zoo are :
1. To improve animal health care and welfare by creating natural habitat and providing food according to their dietary requirement.
2. To encourage research and provide conservation education through first hand experience of wild animals.
3. To raise public awareness about the importance of nature.

Central Zoo houses over 1000 animals of 121 species, among them 34 mammals, 61 birds, 11 reptiles and 15 fish species.

There has been a decade of achievement in conservation education, the most important being :
—Networking with more than 100 schools
—Registered FOZ members – 17000
—Active FOZ members – 4500 - 5000, who participates in various educational program
—The popular programs among the students are animal feeding, night guided tour, zoo patrolling, clean up camp
—FOZ clubs in 40 networking schools
—Experience sharing among schools
—Participate in greenery program
—Conduct various interschool program
—FOZ Teachers' committee of 5 members committee is assisting the zoo to co-ordinate with different schools
—DFID Global Partnership Program
—Recycling Project in 3 Networking schools
—Students exchange program (Nepal and U.K.)
— Increment in level of awareness among students, e.g. number of participation, increase in FOZ members, demand for programs

*** Director, KMTNC Central Zoo, Lalithpur, Nepal**

Conservation Breeding of species with special reference to J&K State (India)

Mir Mansoor*

The overall scenario regarding species endangerment & extinction and the reaction from the conservation community.

J&K State constitutes of three regions and each region is climatically, geographically and culturally very distinct from other two.

J&K State has high mountainous with cold desert like conditions – Ladakh

J&K State has also a beautiful valley surrounded by high lofty snow-covered peaks – that is Kashmir. There are foot hills with some areas adjoining Punjab and having hot desert like conditions – that is Jammu

The Protected Area Network consists of :
A-National Parks:
Dachigam N. Park – Kashmir
Salim Ali N. Park – Kashmir
Kishtwar High Altitude N. Park –Jammu
Hemis High Altitude N. Park – Ladakh

B-Mega Fauna

C- Critically Endangered Species
Efforts are underway using past and present experience with species bred/ maintained in captivity. The erstwhile Srinagar Deer Park – proved a successful experiment . A prestigious project was started by the State Govt. in 1986 under the name of Srinagar Deer Park adjacent to Salim Ali National Park

Species introduced included:
Hangul 2 (1+1) -10
Spotted Deer 4 (3+1) - 9

Musk Deer 2 (1+1) - 4
Ibex 2 (1+1) - 4
The Programme ran smoothly till 1992 but afterwards things could not ran smoothly because of genetic factors, political turmoil and changed government policy.

Other facilities are Pahalgam Deer Park & Rescue Centre and the Gulmarg Deer Park.

*** Chief Wildlife Veterinarian and Biologist**
J & K State Wildlife Protection Department, Srinagar, J & K

Chittagong Zoo, Bangladesh

Mongur Morshed Chowdhury*

The Chittagong Zoo was initiated in 1988 and opened 1989. It initially had 4.9 acres but now it is spread in 6 acres. It is projected to enlarge the zoo to 22 acres. It is located at the heart of Chittagong over looking magnificent views of coastal scenery, uplands, lochs and mountains.

The zoo is governed by a committee with a President who is the Divisional Commissioner of Chittagong, a Vice President who is the District Commissioner, a Members Secretary, who is Land Acquisition Officer and Magistrate, Chittagong, a Veterinary Officer, Supervisor cum Accountant and a zoo clerk in addition to animal caretakers, office runners, ticket booking clerk, ticket checker, night guards and security guards. There is also an executive committee consisting of 30 members of local elite and renowned businessmen, higher governmental officials and private entrepreneurs and the President.

Initially: 5 spp, now 56 spp.
• Mammals 29, Birds 24, Reptiles 3
• Stock position- 253
• Collection
• Education and Research
Awareness about Biodiversity
• Learning facilities for students from different educational institute.
• Research facilities for Veterinary college and Zoology department of Chittagong university.
• Virtual Museum.

Problems are
• Scarcity of land
• Well trained man power
• Insufficient development budget

The zoo has had some achievements in breeding bonnet macaque and emu and in developing attractive educational signage and a dramatic entrance.

*** Veterinary Officer, Chittagong Zoo, Bangladesh**

Rangpur Zoo, Bangladesh

A. K. Saha *

Rangpur Zoo was established in 1991 in northernBangladesh, close to West Bengal. It has an area of 23 acres and attracts nearly one lakh visitors per year.

There are 37 enclosures, a childrens' park, a canteen, conference hall and a water body. Staff consists of a Deputy Curator, a Zoo Officer, and 18 staffs.

The objectives of the Rangpur Zoo are Conservation, Recreation, Education and Research.

Among our achievements are births of Royal Bengal tigers, lion, baboon, waterbuck, peafowl, hyena, pheasants, deer, etc.

Our education programme involves students fromsSchool, college, Veterinary college, NGO workers, privileged group of people. There is a concession in entrance fee for children to encourage zoo education. About 10,000 students visited the zoo last year.

Constraints to our zoo are insufficient staff, lack of funds and insufficient administrative powers.

*** Deputy Curator, Rangpur Zoo, Bangladesh**

Emergent Incidents at Nandankanan Zoo

Manoj Mohapatra *

The Nandankanan Zoo being a large zoo running over many years has had its share of disasters and emergencies. We have developed a crisis management plan to deal with such emergencies. Listed below are some of the disasters which led us to develop contingency plans and which shaped the response to those plans.

Natural Disasters
• Cyclone 29th & 30th October 1999
• Flood – June / July '2001
• Epidemic tiger death 4th & 7th July '2000
• Elephant depredation
• Incidence of fire
• Snake bite – Paria Naik, Prahallad Biswal, Piru Murmu
• Lightening and thunder storm – barasingha (Male) on 23.5.2003

Manmade Disaster.
• Tiger
• Elephant
• Hippopotamus
• Jaguar
• Manipur Deer
• Pangolin
• Python

Animal Escape
• Failure of Water / Power Supply
• Culling by miscreants of nilgai and caiman
• Trespass of visitor into animal enclosure
• Failure of food supply – beef non supply from 5th June '02
• Casualty at Boat Ghat on 12.6.2001
• Derail of Ropeway on 11.1.98
• Detracting of Ropeway on 23.10.98
• Breakage of entrance gate of Lion safari on 15.4.2001
• Animal confrontation – interspecific - lioness and tiger on 4.10.2001; intraspecific – sambar and barasingha (Male)
• Electrocution – barasingha male on 26.8.2003

• Infliction of injury on keepers by captive animals – injury by antler of spotted deer
• Injury by Cassawary

Emergency preparedness
• A train man power – establish line of command
• Logistics supports (emergency kit) – available easily during emergency situations.
• Intermittent training on first aid, rescue operation, use of emergency kit
• Reduce response time by mock practice
• Stipulate regulatory measures if required

*** State Medicinal Plant Board, Bhubaneswar, Orissa**

Problems and achievements of Dhaka Zoo

Narayan Chandra Banik, Syed Ali Ahasan, Shahzaman Azharul Islam Khan *

Dhaka Zoo was established in 1974 on an area of 187 acres (75 hac.) with 187 staffs. Last year the zoo had about 3.5 million visitors and earned revenue of about Tk 3 crores.

Present Animal Stocks

Class	Numbers	
	Species	Total
Mammals	57	500
Reptiles	13	64
Birds	76	1285
Fishes	31	425
Total	**177**	**2274**

Management-Problems :
• Insufficient training for the officers
• Animal care takers not sufficient
• Education level for the care taker's is low
• No formal training for the animal care takers
• No encouraging facilities like promotion, insurance or risk allowance, house facilities for ACTs.
• Faulty design in most old enclosures
• Insufficient budget for maintenance
• Even no budget for one way freight fare regarding exchanging animals
• lack of modern equipments for cleaning
• Zoo act is yet to be established
• Less financial power with zoo authority
• Lack of modern slaughter house

Success Stories
• Egg hatching in vulture
• Breeding in nilgai
• Acquired marsh crocodiles from Madras crocodiles bank

Nutrition- Achievements
• Quality of feed has been improved
• Lion and tiger's feed are specially followed by BMR
• Feed ingredients determined by main source of nutrients and closeness to the natural feed and habitat.
• Minimizing feed costs through diversified feed supply.
• Vitamin-mineral premix added to make balanced ration
• Carnivores are being given a more varied diet to include buffalo, goat and chicken in addition to beef.
• Animal health status is satisfactory

Feeding System
Feeding system has been improved little in herbivores, but we need to develop more feed supply time for carnivores changed. Now, primates are fed twice a day.

Challenges and problems
• The Dhaka Zoo has more single animals than we want and are engaged in a search for mates for estuarine crocodile, gini babbon and impala.
• It is believed that inbreeding depression was responsible for the condition of a blind lion cub, a defective limb in tiger, congenital defect in a nilgai (eye) and sudden death in gayal calf.

Health Care - Problems
• The zoo has no independent diagnostic laboratory.
• Also there is insufficient technical resource personnel and sub-technical persons. It is difficult to procure tranquilizing medicine and vaccines
• Coccidioidomicosis infection in gayal
• Tuberculosis- Spotted deer, monkey, mandrill, nilgai, gayal, horse, common langur, lion
• Salmonellosis in Pheasants

Zoo Education - Problems
• No infrastructure facilities.
• Lack of logistic supports.
• No prepared teaching modules for lessons
• It has highly been emphasized in the internal meeting and included in next project proposal for implementation
• We have just initiated the zoo education program in small scale
• Other education and training for the students going on as usual in the zoo museum

Future Project Plan includes a zoo education centre, a children's park, visitors' facilities, modernization in veterinary hospital, modernisation of zoo museums and zoo website.

*** Dhaka Zoo, Bangladesh**

Poisonous Land Snakes of Sri Lanka

K. N. Senarath de Silva *

There are 94 species of land snakes living in Sri Lanka of which 35 species are poisonous and 59 species are non poisonous. There are 13 spcies of sea snakes and 22 fresh water snakes. Seven species are highly poisonous; 3 species are less so, and 12 species are mildly poisonous.

Highly Poisonous Snakes
Bungarus caeruleus, Indian krait
Bungarus ceylonicus, Ceylon krait
Echis carinatus carinatus, Saw -scaled viper
Daboia russelli, Rusell's viper
Naja naja, Cobra
Hypnale hypnale, Merrem's humpnosed viper
Calliophis melanurus sinhaleus, ceylon coral snake

Lesser Poisonous Snakes
Trimeresurus trigonocephalus, Green pit Viper
Hypnale walli, Gloyd 's humpnosed viper
Hypnale nepa, Millard's 'humpnosed viper

Mildly Poisonous Snakes
Boiga barnesi, Barne's cat snake
Boiga trigonata trigonata, Indian Gamma cat snake
Boiga forsteni Forsten 's cat snake
Boiga ceylonensis Sri Lanka cat snake
Boiga beddomi Beddome 's cat snake
Balanophis ceylonensis Sri Lanka Keel Back
Chrysopelea ornata sinhaleya Gold & black tree snake
Chrysopelea taprobanica Srilanka flying snake
Ahaetulla pulverulentus Thunderbolt Snake
Ahaetulla nasutus Green Whip Snake
Cerberus rhynchops rhyncops Dog- faced water snake
Gerada prevostiana, Gerard's Water Snake

*** Education Officer, National Zoological Gardens, Sri Lanka**

Arignar Anna Zoological Park

A. Manimozhi*

Mission Statement
The mission of the Arignar Anna Zoological Park is to encourage people to develop a caring attitude towards flora and fauna; to serve as a dynamic nature conservation centre by promoting breeding programme for rare and endangered species of the Western and Eastern Ghats, and to offer excellent public service, recreation, eco-awareness and education.

The Arignar Anna zoo houses 177 species of animals (as on 30.09.2005). Arignar Anna Zoo has a breeding plan for endangered species conservation breeding programme.

Special features of the Arignar Anna Zoological Park are water fall entrance, aquarium, prey predator enclosure, lion safari, water birds aviary, serpentarium, prehistoric animal park, nocturnal animal house, amphibian house, butterfly farm, bio-centre, small mammal house, Biological Science, Ethology, Animal husbandry, Bio-diversity, Ecology, Cultural Enrichment, Genetics, Nature conservation, Captive Breeding, Wildlife Management, Zoo Outreach programme, Zoo school, Zoo club, Teachers training programme, Zoo volunteers programme, Zoo News letter, Zoo Guide, and Zoo Website.

*** Biologist, Arignar Anna Zoological Park, Chennai - 48**

SAZARC
South Asian Zoo Association for Regional Cooperation

Avian Flu Pandemic of the 21st Century

Mir M. Mansoor*

Bird flu is an infection caused by avian (bird) influenza (flu) A viruses. It can affect domestic and wild bird species including chickens, turkeys, ducks, geese, gulls and shorebirds. Aquatic birds (ducks, shore birds, and gulls) are the natural reservoirs for the avian flu viruses, but waterfowl do not develop disease when infected with avian influenza (asymptomatic).

Bird flu viruses are different from human flu viruses. There are 16 different HA subtypes and 9 different NA subtypes of flu A viruses. Many different combinations of HA and NA proteins are possible. Each combination is a different subtype. All subtypes of flu A viruses are found in birds. They do not usually infect humans, even though we know they can do so. Human flu viruses are those subtypes that occur widely in humans. There are only three known subtypes of human flu viruses (H1N1, H1N2, and H3N2); Flu A viruses are constantly changing, and they might adapt over time to infect and spread among humans.

The risk from bird flu is generally low to most people because the viruses occur mainly among birds and do not usually infect humans. However, during a bird flu outbreak among poultry (domesticated chicken, ducks & turkeys), there is a possible risk to people who have contact with infected birds or surfaces that have been contaminated with excretions from infected birds. The current outbreak of avian influenza A (H5N1) among poultry in Asia is an example of a bird flu outbreak that has caused human infections and deaths. In such situations, people should avoid contact with infected birds, contaminated surfaces and should be careful when handling and cooking poultry.

Symptoms of bird flu in humans are: Typical flu-like symptoms (fever, cough, sore throat & muscle aches); Eye infections; Pneumonia; Severe respiratory diseases (such as acute respiratory distress), and other severe and life-threatening complications. The symptoms of bird flu may depend on which virus caused the infection.

Bird flu treatment in humans : Studies suggest that the prescription medicines approved for human flu viruses would work in preventing bird flu infection in humans. However, flu viruses can become resistant to these drugs, so these medications may not always work.

Bird flu spreads when infected birds shed flu virus in their saliva, nasal secretions, and faces. Susceptible birds become infected when they have contact with contaminated excretions or contaminated surfaces that are exposed to such excretions. It is believed that most cases of bird flu infection in humans have resulted from contact with infected poultry or contaminated surfaces.

H5N1 bird flu

Outbreaks of influenza H5N1 occurred among poultry in eight countries in Asia (Cambodia, China, Indonesia, Japan, Laos, South Korea, Thailand, and Vietnam) during late 2003 & early 2004. During these outbreaks, more than 100 million birds in the affected countries either died from the disease or were killed in order to try to control the outbreak. Beginning in late June 2004, new deadly outbreaks of bird influenza H5N1 among poultry were reported by several countries in Asia (Cambodia, China, Indonesia, Malaysia [first-time reports], Thailand, and Vietnam). It is believed that these outbreaks are ongoing. Human infections of influenza A (H5N1) have been reported in Thailand, Vietnam and Cambodia.

This is of great concern because the H5N1 virus mutates rapidly and can infect other animals like pigs, causes severe disease or fatality in humans, has a high pathogenicity (birds die within 48 hours), birds that survive infection excrete the virus for at least 10 days making it easier to spread the virus in live-poultry markets and by migratory birds, survives now for longer in the environment when compared with its first emergence in 1997, has expanded its mammalian host range including pigs and — finally — has been found increasingly in dead migratory birds (which usually is not affected by the virus).

Major outbreaks of H5N1Avian Influenza 28 June 2005 In people, there have been 108 human cases, 54 fatal; unofficial numbers are higher, and in the following countries Cambodia, China, Hong Kong, Indonesia, Japan, Malaysia, Laos, South Korea, Thailand, Vietnam.

Routes of H5N1 bird-to-bird transmission include: Airborne transmission if birds are in close proximity; direct contact with contaminated respiratory secretions or fecal material; broken contaminated eggs infecting healthy chicks; movement of infected birds between flocks; movement of contaminated clothing, shoes, equipment, egg flats, feed trucks; contact with infected wild birds & waterfowl; fecal contamination of water and garbage flies.

Treatment in humans

The H5N1 virus currently infecting birds in Asia that has caused human illness and death is resistant to amantadine and rimantadine, two antiviral medications commonly used for influenza. Two other antiviral medications, oseltamavir & zanamavir, would probably work to treat flu caused by the H5N1 virus, though studies still need to be done to prove that they work.

There currently is no vaccine to protect humans against the H5N1 virus that is being seen in Asia. However, vaccine development efforts are under way. Research studies to test a vaccine to protect humans against H5N1 virus began in April 2005. (Researchers are also working on a vaccine against H9N2, another bird flu virus subtype.)

H5N1 virus as a biological weapon is extremely contagious, high mortality rate, severe economic consequences of an outbreak, virus has a high potential for genetic mutations and for new strains to arise and affect new species.

*** Chief Wildlife Vet. & Biologist, J&K State Wildlife Protection Department**

Chennai Snake Park

V. Kalaiarasan*

About the Chennai Snake Park

The Chennai Snake Park (Madras Snake Park as it was known earlier) was established in 1972 at Guindy in Chennai. It has been granted recognition by the Central Zoo Authority. It attracts about seven lakhs of visitors in a year including two lakhs of children. The live exhibits, reptile museum, display boards, audio visual facilities and library play a crucial role in educating the public about snakes and other reptiles.

Aims and Objectives of Chennai Snake Park

I. To maintain and display a captive collection of snakes and other reptiles as a mean of education of the public.
2. To undertake captive breeding of vulnerable species of snakes and other reptiles.
3. To promote knowledge on snakes, and other reptiles and amphibians and dispel the erroneous beliefs about them.
4. To aid and assist research on reptiles and amphibians.
5. To provide facilities for the identification and classification of snakes and other reptiles and amphibians and, for this purpose, maintain a museum of study collections.
6. To maintain a library of books and other literature on reptiles and amphibians.
7. To publish scientific and semi-scientific literature on snakes and other reptiles and amphibians.
8. To undertake survey on the distribution and status of snakes and other reptiles and amphibians.
9. To provide consultancy services on snakes and other reptiles.
10. To provide a common forum for interaction among amateur scientists and friends of reptiles and amphibians.

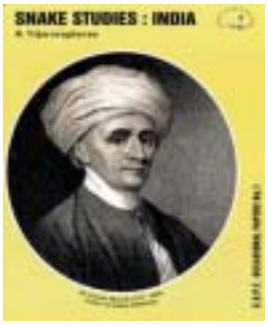
The Chennai Snake Park conducts outreach programmes, particularly in schools, to convey the right information on snakes and other reptiles. The Snake Park has played a valuable role in the conservation of reptiles in India and also in motivating similar ventures elsewhere in the country. The Snake Park's quarterly newsletter *Cobra* publishes articles of scientific, semi-scientific and popular nature on snakes and other reptiles and amphibians.

Education and Awareness: There is an environmental orientation programme for school teachers, school students, for forest department personnel, for fire and rescue service personnel, an exposure visit for students and special programmes such as farmer's meet, quiz programmes and photo exhibition. CSP also has published many books, newsletters, reports and articles.

Reptiles displayed at Chennai Snake Park

Indian rock python, *Python molurus*
Reticulated python, *Python reticulatus*
Common sand boa, *Gongylophis conicus*
Red sand boa, *Eryx johnii*
Common trinket snake, *Coelognathus helena helena*
Indian rat snake, *Ptyas mucosa*
Common kukri snake, *Oligodon arnensis*
Common bronzeback tree snake, *Dendrelaphis tristis*
Common wolf snake, *Lycodon aulicus*
Checkered keelback, *Xenochrophis piscator*
Striped keelback, *Amphiesma stolatum*
Olive keelback, *Atretium schistosum*
Common cat snake, *Boiga trigonata*
Common vine snake, *Ahaetulla nasuta*
Dog-faced water snake, *Cerberus rynchops*•
Common krait, *Bungarus caeruleus*
Spectacled cobra, *Naja naja*
Hook-nosed sea snake, *Enhydrina schistosa*
Yellow sea snake, *Hydrophis spiralis*
Annulated sea snake, *Hydrophis cyanocinctus*
Common small-headed sea snake, *Hydrophis gracilis*
Russel's viper, *Daboia russelii*
Saw-scaled viper, *Echis carinatus*
Hump-nosed pit viper, *Hypnale hypnale*
Malabar pit viper, *Trimeresurus malabaricus*
Bamboo pit viper, *Trimeresurus gramineus*
Marsh crocodile, *Crocodylus palustris*
Saltwater crocodile, *Crocodylus porosus*
Gharial, *Gavialis gangeticus*
Nile crocodile, *Crocodylus niloticus*
Morelet's crocodile, *Crocodylus moreletii*
Siamese crocodile, *Crocodylus siamensis*
African dwarf crocodile, *Osteolaemus tetraspis*
Spectacled cayman, *Caiman crocodilus*
Spotted pond turtle, *Geoclemys hamiltonii*
Indian black turtle, *Melanochelys trijuga*
Star tortoise, *Geochelone elegans*
Indian flapshell turtle, *Lissemys punctata*
Aldabra tortoise, *Geochelone gigantea*
Slider turtle, *Pseudemys scripta*
Spotted rock gecko, *Hemidactylus maculatus*
Rock lizard, *Psammophilus blanfordanus*
Green calotes, *Calotes calotes*
South Asian Chamaeleon, *Chamaeleo zeylanicus*
Bengal monitor, *Varanus bengalensis*
Yellow monitor, *Varanus flavescens*
Water monitor, *Varanus salvator*

*** Director, Chennai Snake Park, Chennai**



Achievements and Problems of Dulahazara Safari Park over the Year 2004 - 2005

Zahed Md. Malekur *

The concept of safari is very new to our country. To conserve wildlife of Bangladesh the first deer breeding centre was started at Dulahazara bit under Cox's Bazar district in 1981-82. In the year 97- 98, Dulahazara Safari Park project under wildlife management and nature conservation division, forest department, started including this deer breeding centre. The natural landscape is 107 km south from Chittagong city and 40 km distance from Cox's bazar district, Bangladesh. The park mainly formed by the union of small hills. Geologically this zone included in Pliocene age of tertiary period, which was formed 25 millions years ago. It is included in Dupitila series that was formed by sand stone and shale stone. The zoo acquired land first of 300 ha. then, and by the year 2000. 300 ha.; and in (2005): 1296 ha.

Species found: Mammals(29) Reptiles(9), Birds(47). The animals are both in captivity and free ranging in safari park area. Total Number of animals: Mammals 523, Birds 211, Reptiles-75. Total manpower: 45. Facilities for animals: Conservation, breeding, free living, animal welfare etc. Facilities for visitors: Recreation, eco-tourism, all time bus service, research, education etc. There is also a display map, observation tower, artificial lake, elephant riding, visit to tiger and lion enclosure, nature centre, museum etc.

Dulhazara Safari Park - Aims and Objectives

— Conservation and population increase of (nationally) extinct and threatened wild animal spp. like rhino, lion, deer, crocodile etc.
— To provide assistance for *in-situ* conservation of critically endangered wildlife.
— Development of rescue centre and veterinary hospital to provide assistance to injured wildlife in the country.
— Development of nature interpretation centre with light and sound model for creation of conservation awareness.
— Establishment of large water body for migratory birds.
— Establishment of aviary for exotic, rare, endangered species of birds.
— Habitat development for wild animals.
— Establishment of information and education centre for awareness building.
— Establishment of a natural history museum for plants and animals endemic to the area.
— Development of eco-tourism facilities.
— Development of orchid house.
— Development of research and education facilities.
— Development of recreation zone in the Medakacchapia area of the park.

Innovation of a model safari park. Conservation – The park helping in conservation and preservation of indigenous as well as uncommon exotic wild animals and providing facilities for eco-tourism, education and research. Wildlife habitat simulated through the safari park. Now it is an important breeding ground for endangered wild animals of the country.

Education — In education and information centre there is a briefing room where visitors get detail idea about safari park and zoo through video briefing /documentary film. In every week veterinary surgeon arrange a program for visitors to brief about wildlife in briefing centre or sometimes in animal enclosure area. There is a natural history museum with 2000 specimen of vertebrate and invertebrate as well as plants. From above facilities visitors, students and researcher get an idea about wild life of Bangladesh. Signboards : — Direction boards, enclosure label boards with biological information, guide map showing locations of facilities and various attraction and other publications. Nature Interpretation Centre : — There is a nature interpretation centre in our park. In this centre we made all types of forest and Bangladesh wildlife by model, light and sound. Visitors enjoys a 25 minutes long audio visual program in this centre.

Breeding : Over the year 2004-2005, we get remarkable reproduction from following species: Sambar deer (3 offspring), Barking deer(12), Spotted deer(9), Goyal (2) Fishing cat (3)Wild boar (7), Black bear (2) Rhesus macaque (13), Capped langur (7),Pigeon (2) Jungle fowl (5) Silver pheasant (2)

Veterinary Hospital : There is a veterinary hospital under in charge of veterinary surgeon and well equipped with tranquilizing gun, blow pipe, microscope, incubator, laboratory, operation theatre, five numbers of isolation room, post-mortem room. Veterinary surgeon playing an important role in both treatment, management, ration formulation and education.

Research in the year 2004 - 2005, 1,20,000 students from different Universities, Colleges, Schools were visited safari park as study tour. Some researchers worked in our park where there are three rest house, dormitory and vehicles, laboratory, researcher can use all of the above facilities through proper permission of Director. A research facility may be set up near the veterinary hospital for encouraging research in wild life science.

The Dulahazara Safari Park has all public facilities in abundance, All efforts are made to make visitors comfortable and safe.

The safari also has problems. We need modern management training, more manpower. We need to learn ways of marking our free ranging animals and solving all health related problems. We need better quarantine. Funds are not unlimited and we, like zoos, suffer from insufficient funds to do all the things we want to make the park a success. Though the Dulahazara Safari Park started by the year 1997-98 it has actively worked from the year 2001. As a new and only one safari park of Bangladeshits progress is remarkable and it's popularity increasing day by day in our country. If the safari personnel are properly trained up and other problems solved, we hope the institution will be a model of Safari.

*** Veterinary Officer, Dulahazara Safari Park, Cox's Bazzar, Bangladesh**