"Concept paper on *In-situ ex-situ* linkage - Conservation Breeding of Endangered Wild Animal Species in India"

Introduction:

India, 328.7 million hectare of land mass, occupies 2.4% of world's total area. The population of India at 1027 million in 2001 constituted about 16.7% of world's population. There are more than 500 million cattle and poultry in the country.

The total area under forest cover in India is 77.47 million hectare, which is 23.57% of the total land area. 606 protected areas comprising 96 national parks and 510 wildlife sanctuaries with overlapping of 28 tiger reserves and 25 elephant reserves cover an area of 15.59 million hect. and making up about 4.58% of the total geographic area and 22.12% of total forest cover of the country. In addition to that, there are 150 recognized Zoological Parks having around 40,000 wild animals in captivity in the country.

India is among the 12 mega biodiversity countries of the world. 350 species of mammals, 1224 of birds, 408 of reptiles, 197 of amphibians, 2546 of fishes, 57548 of insects and 46286 species of plants found in India form 8% of the world's diversity of life forms.

The country stands out as a treasure trove of natural wealth despite countless obstacles to their conservation. Habitat loss has been due to severe biotic pressure, diversion of forest land for non-forestry purposes or illegal occupation, degradation of habitat, fragmentation of habitat. Problems are manifold.

There is an urgent need to conserve its forests and wildlife. The Government of India has always been sensitive to this and taken several initiatives towards preservation of forests and wildlife in the country from time to time.

The first regular policy statement relating to forestry in India was issued in 1894. After independence, a new National Forest Policy was enunciated in the year 1952, which substantially removed the angularities in the earlier Policy of 1894. The 1952 Policy was replaced by the National Forest Policy of 1988 and has been adopted by all the States.

Forest legislation in India dates back to 1865 when the first Indian Forest Act was passed. This Act was later revised in 1878. The process continued till the currently applicable Indian Forest Act of 1927. The Wild Life (Protection)

Act, 1972 was enacted to give proper shape to wildlife conservation in the country. This Act was amended in 1982, 1986, 1991, 1993, 2003 and 2006 to make it more comprehensive. The Forest (Conservation) Act was enacted in 1980 with a view to check indiscriminate diversion of forest land for non-forestry purposes.

The Central Zoo Authority was created by the Government of India in the year 1992 through an amendment of the Wild Life (Protection) (Amendment 1991) Act, 1972. The main objective was to enforce minimum standards and norms for upkeep and health care of animals in Indian Zoos so that the Zoos of the country come up to a standard where they can complement and strengthen the national efforts in conservation of wild fauna of the country.

The need for *ex-situ* conservation of wild fauna as one of the main objectives for management of Zoos was realized by the Government of India soon after independence and the then Indian Board for Wildlife (now the National Board for Wildlife) made important recommendations in this regard. An Expert Committee on Management of Zoos was set up in November, 1972 and its recommendations were accepted in June, 1973, which still have relevance in the current period. The National Wildlife Action Plan of 1983 again emphasized the role of *ex-situ* conservation in national conservation efforts. The National Wildlife Action Plan (2002-2016) also lays emphasis on the role of Zoos for *ex-situ* breeding of endangered species of wild fauna and their rehabilitation in the wild as per the IUCN guidelines for reintroduction. The Central Zoo Authority has been identified under the Plan, as one of the organizations for developing capabilities in this field.

To give proper direction and thrust to the management of Zoos in the country, the National Zoo Policy was framed and adopted by the Government of India in the year 1998. The main objective of the Zoos under the National Zoo Policy is to complement and strengthen the national efforts in conservation of rich bio-diversity of the country, particularly the wild fauna. This objective can be achieved by supporting the conservation of endangered species by giving species, which have no chance of survival in the wild, a last chance through coordinated breeding under *ex-situ* conditions and raise stocks for rehabilitating them in wild, as and when, it is appropriate and desirable. Conservation education and research for conservation of wildlife are other objectives of Zoos enshrined in the National Zoo Policy.

Objectives

Today when wildlife habitat is under severe pressure and a large number of species of wild animals have become endangered, the Zoos have not only to sustain their own population, but also augment the depleting populations of endangered species in the wild. Keeping in view of these facts, a group of

experts was formed by the Central Zoo Authority just after its creation in 1992 with a mandate to prepare a strategy for conservation breeding of endangered species in Indian Zoos. The group identified about 35 mammals, birds and reptiles for their probable captive breeding in identified Zoos. The Chief Wild Life Warden's of the States within the natural distribution of the species, were selected as coordinators for the species under the programme. Responsibility for maintaining of the studbook for select endangered species was also given to Zoos. However, because of varied ownership patterns of the Zoos and divergent nature of animal collections, not much was achieved.

Taking note of the past success and failure of *ex-situ* breeding of endangered species in Indian Zoos, the issue was again taken up for discussion in the meeting of the Central Zoo Authority in the year 2005.

This was felt that Indian Zoos have to have at least 100 properly and scientifically bred and physically, genetically and behavirourally healthy individuals of each endangered wild animal species in captivity to act as insurance cover in case of population loss of the species in the wild. Three objectives i.e. having proper captive stocks to continue display, have properly bred animals to act as insurance and for reintroduction or release in the wild in case needed, form very base of planned coordinated conservation breeding programme in Indian Zoos.

Initiatives

In spite of all efforts in the past, the conservation breeding of identified endangered species could not be implemented in toto in Indian Zoos as the number of animals of such species in Indian Zoos was either small or the Zoos did not have the species in captivity. Another reason was non-availability of technical personnel to monitor the programme as well as financial resources to run the programmes. To bring in a holistic development of Zoos in India and to achieve the main objective of Zoos as Centres which can compliment the national effort of wildlife conservation in India, we need to infuse more technical and scientific culture in operation of our Zoos and change the general perception of Zoos from being mere picnic spots to more of a scientific institution.

All the Zoos in India are equipped with small veterinary facilities along with veterinary personnels as per the classification of the Zoo and as per the standards and norms under the Recognition of Zoo Rules, 1992. The Zoos have also been asked to develop mechanism with local veterinary colleges/ universities/ hospitals in the region to provide specialized services and diagnostic facilities to them. Indian Veterinary Research Institute, Bareilly has been identified as a National Referral Centre (NRC) to provide super specialty services and diagnostic facilities to the Indian Zoos to deal with the issue of health care of

wild animals, training of Zoo veterinarians and conducting research on health care and nutrition of wild animals in captivity.

The coordinating and participating Zoos have been asked to construct appropriate enclosure for the targetted wild animal species to fulfill their physical and behavioural needs. The coordinating Zoo for each targetted species have also been requested to create off-display conservation breeding facility either in the Zoo compound or as satellite facilities. School of Planning & Architecture (SPA), New Delhi has been assigned the study on Zoo Design and Architecture to help the Zoos in this regard. In order to infuse new technology in the field of reproduction and molecular characterization of endangered species, a Laboratory (Laboratory for Conservation of Endangered Species – LaCONES) has been established at Hyderabad. A Memorandum of Understanding (MoU) has been signed with the Wildlife Institute of India, Dehradun for preparation and updating of National Studbook for the identified endangered wild animal species being taken up for conservation breeding programme. The Zoos are also being provided funds in form of small grant fellowships to organize studies to deal with the local issues and the coordinating Zoos have been asked to engage technical manpower for preparation of conservation breeding management plans for the targetted species. All these initiatives are being made to modify and equip the Zoos for taking up this great responsibility and participate in conservation breeding programme. ISIS –ZIMS Authorities have also been contacted to assist the Indian Zoos in data compilation and recordkeeping.

Strategy

The ex-situ conservation breeding of endangered species in India is a joint venture of *in-situ* and *ex-situ* wildlife managers. This is a need based activity. The Chief Wild Life Wardens and protected area managers have been requested to identify the species which need immediate intervention in the form of *ex-situ* conservation breeding for the protected areas under their control. Wildlife Wing of the State Governments have been requested to conduct time to time census of wild animals in collaboration with scientific institutions and non government organizations to assess the field conditions as well as identify animal species which need help from Zoos. Another component of the programme is identification of the Protected Area having wild population of the proposed species/ re-introduction site in the vicinity of the conservation breeding facility. The *in-situ* managers of the protected areas will be taking corrective measures to address the cause of decline/ extinction of wild population of the targeted species in its natural habitat. Analyzing suitability of the wild habitat for the targeted species, the number of animals left in the habitat, assessing and analysing the cause of decline/ loss of number of animal species and the inputs required for the improvement of the habitat in the form of habitat manipulation to make it more suitable for the target species and protection required in case the cause is found to be hunting, trapping etc. form major component of the

programme. It was felt that critically endangered wild animal species with few hundreds/ thousands (or say less than 2500) left in the wild need to be taken up for ex-situ conservation breeding in the Zoos on immediate basis in the country. Species with localized distribution should get preference in the scheme of things.

The existing Zoos are the other major component of the programme as there is huge infrastructure and trained manpower available there to deal with the issue. Two to four Zoos (participating Zoos) in the habitat range of the targeted species will take part in the breeding programme of the targeted species. Conservation breeding facility in the form of off display centre (if the appropriate land is available in the Zoo compound) or in the form of satellite facility will be created only in one (coordinating Zoo) to two Zoos of the region. Other Zoos in the country in addition to the coordinating Zoo and participating Zoos may continue to display the species in naturalistic enclosures.

The possibility of identifying around 25 animals as founders will be assessed from the existing captive population in Indian Zoos. Efforts will be made to acquire suitable founders from rescue centres and foreign Zoos to initiate the programme or to induce new blood into the existing founder population. If required, the Government of India will also be approached for allowing acquisition of animals of wild origin from the rescue centres or from wild for initiation/ continuation of breeding programmes. The target will be to have at least 100 physically, genetically and behaviourally healthy animals in captivity in Indian Zoos/ breeding centres. Sequence of steps to be taken up under the planned coordinated Conservation Breeding Programme of critically endangered wild animal species in India is:

1. Identification of species
2. Approximate number of animals of the species in the wild.
3. Number of animals of the species in captivity in Indian Zoos.
4. Identification of coordinating Zoos
5. Identification of participating Zoos
6. Existence of animal enclosures in coordinating, participating and other Zoos.
7. Existence/ creation of off-display enclosure for conservation breeding in coordinating Zoo
8. Identification of founders
9. Marking of founders (transponders, ear tags or rings)
10. Preparation of animal history sheets and animal observation sheets of the identified founders by the Zoos
11. Compilation of Studbook by the National Studbook Keeper, (Wildlife Institute of India, Dehradun)
12. Liaison with the International Studbook Keeper of the species (if any)
13. Possibility of acquiring the founders from foreign Zoos (if required) and details of the Zoos from where founders can be acquired

14. Physical health check-up of the founders using the veterinary hospital in the Zoo as well as National Referral Centre (Indian Veterinary Research Institute, Bareilly)
15. Genetic health check-up of the founders using blood samples or body parts with help from LaCONES, Hyderabad
16. Engagement of Technical Assistant in the coordinating Zoo
17. Preparation of conservation breeding management plan of the species.

The creation of appropriate housing facility in the form of off-display conservation breeding centre/ satellite facility along with the project office in the coordinating Zoos will be funded by the Central Zoo Authority on 100% basis. The maintenance of the conservation breeding facility will be the sole responsibility of the Zoo Operators/ State Governments.

More than 90% of the recognized Zoos in the country are operated or controlled by the State Forest/ Wildlife Departments. These are also managing the in-situ facilities that make the coordination between the in-situ and ex-situ wildlife conservation activities much easier.

Help of the national/ international organization, institutions, NGOs and related bodies will also be sought to make the programme successful. World Association of Zoos & Aquariums (WAZA) will also be requested to support the activity as part of global species management programme. Conservation Breeding Specialist Group of SSC-IUCN will also be engaged in the activity. The wild animals bred as part of the coordinated conservation breeding activity, will occasionally be released in the identified habitats following IUCN guidelines for the purpose involving Reintroduction Specialized Group of SSC-IUCN. The main purpose of this will be to have hands on experience and develop the mechanism for such operations, so that they can be used in case of exigencies in formal release operations, Zoos may have to conduct in future.

Present stock of wild animals of the commoner species from unplanned breeding of unknown lineage or prolific breeding species in Indian Zoos again of doubtful lineage will be phased out and replaced by the individuals of the desirable species bred and kept in more planned and scientific ways, which are physically, genetically, behaviourally healthy and can be used as future insurance for the cases of exigencies. The conservation breeding programme is not necessarily to breed the animals of the targetted species for reintroduction in the wild only but to have proper stock for display in the Zoos and to have the right animals as an insurance for exigencies and for experimental release in the wild.

List of the identified endangered wild animal species to be taken up for the planned coordinated Conservation Breeding giving details of the coordinating Zoos, participating Zoos and the number of animals of the species in captivity in India

Sl. No.	Name of the Species	Name of the coordinating Zoo	Names of the participating Zoos	Number of animals of the species in captivity
1.	Asiatic lion (*Panthera leo*)	Junagarh	Hyderabad, Bhopal, New Delhi, Rajkot	80
2.	Bengal tiger (*Panthera tigris*)	Bhopal	New Delhi Hyderabad, Bhubaneswar, Chhatbir, Chennai	255
3.	Snow leopard (*Panthera uncia*)	Darjeeling	Leh, Kufri, Nainital, Gangtok	18
4.	Clouded leopard (*Panthera nebulosa*)	Sepahijala	Guwahati	14
5.	Asiatic cheetah (Acinonyx jubatus venaticus)	Junagarh	--	--
6.	Golden cat (*Catopuma temmincki*)	Guwahati		3
7.	Tibetan wolf (*Canis lupus*)	Darjeeling	Gangtok, Nainital, Kufri	21
8.	Wild dog (*Cuon alpinus*)	Visakhapatnam	Chennai	30
9.	Brown bear (*Ursus arctos*)	Kufri	Leh	2
10.	Sun bear (*Helarctos malayanus*)	Aizawl	Guwahati	2
11.	Red panda (*Ailurus fulgens*)	Darjeeling	Gangtok, Yachuli	18
12.	Binturong (*Arctictis binturong*)	Sepahijala	Guwahati, Aizawl	13
13.	Pangolin (*Lepus nigricollis*)	Bhubaneswar	--	8
14.	Lion tailed monkey (*Macaca silenus*)	Chennai	Mysore, Trivandrum	60
15.	Pig-tailed monkey (*Macaca nemestrina*)	Sepahijala	Guwahati	18
16.	Stump tailed monkey (*Macaca radiate*)	Aizawl	Guwahati	51
17.	Phayre's leaf monkey (*Trachypithecus phayrei*)	Sepahijala	--	14
18.	Crab eating monkey (*Macaca fascicularis*)	Chidiyatapu (Port Blair)	--	12
19.	Nilgiri langur (*Semnopithecus johnii*)	Chennai	Mysore	27
20.	Golden langur (*Trachypithecus geei*)	Guwahati	Island near Guwahati	14
21.	Capped langur (Trachypithecus pileatus)	Rangapahar	--	6
22.	Hoolock gibbon (*Hoolock leuconedys*),	Itanagar	Aizawl, Guwahati, Sepahijala	11
23.	Rhinoceros (*Rhinoceros unicornis*)	Guwahati	Patna, New Delhi, Kanpur	36

24.	Indian bison (*Bos gaurus*)	Mysore	Chennai, Bondla	37
25.	Wild ass (*Equus hemionus khur*)	Junagarh	--	11
26.	Himalayan tahr (*Hemitragus jemlahicus*)	Gangtok	Darjeeling, Kufri, Chopta	3
27.	Nilgiri tahr (*Nilgiritragus hylocrius*)	Ooty	--	1
28.	Markhor (*Capra falconeri*)	Pehalgaon	--	-
29.	Blue sheep (*Pseudois nayaur*)	Gangtok	Darjeeling	-
30.	Serow (*Nemorhaedus sumatraensis*)	Guwahati	Manipur	6
31.	Swamp deer (*Cervus duvauceli*)	Lucknow	Jaldapara WLS	115
32.	Thamin deer (*Cervus eldii*)	Manipur	Guwahati, Kolkata, New Delhi	177
33.	Mouse deer (*Tragulus meminna*)	Hyderabad	Bhubaneswar	13
34.	Musk deer (*Moschus chrysogaster*)	Chopta	Gulmarg, Gangtok, Kufri	11
35.	Hangul (*Cervus elaphus hanglu*)	Shikargah	--	1
36.	Chiru (*Pantholops hodgsonii*)	Leh	--	2
37.	Pygmy hog (*Sus salvanius*)	Basistha	Guwahati	112
38.	Himalayan monal (*Lophophorus impejanus*)	Manali	Darjeeling, Gangtok	23
39.	Blood pheasant (*Ithaginis cruentus*)	Gangtok	Darjeeling	--
40.	Cheer pheasant (*Catreus wallichi*)	Chail	Almora	48
41.	Hume's pheasant (*Syrmaticus humiae humaie*)	Aizawl	--	4
42.	Grey Peacock pheasant (*Polyplectron bicalcaratum*)	Guwahati	Kolkata, Darjeeling	60
43.	Sclater's (mishmi) monal (*Lophophorus sclateri sclateri*)	Yachuli	--	--
44.	Tibetan eared pheasant (*Crossoptilon harmani*)	Yachuli	--	--
45.	Temminck tragopan (*Tragopan temminckii*)	Yachuli	--	--
46.	Blyth's tragopan (*Tragopan blythii*)	Kohima	--	12
47.	Western tragopan (*Tragopan melanocephalus*)	Sarahan	--	8
48.	Styr tragopan (*Tragopan satyra*)	Darjeeling	Gangtok	2
49.	Grey jungle fowl (*Gallus sonnerati*)	Tirupati	--	33
50.	Red jungle fowl (*Gallus gallus gallus*)	Morni	Chail, New Delhi, Aizawl	209
51.	Vultures (White backed Vulture, Himalayan Griffon Vulture, etc.)	Pinjore	Hyderabad, Bhopal, Junagarh, Bhubaneswar, Rajabhatkhawa, Guwahati	93
52.	Falcons (Eagles, Hobbies, Kestral, Harrier, accipiter, etc.	Chhatbir	Jaipur	3

53.	Bustards (Great Indian bustard, Lesser florican, Bengal florican, Hubara bustard)	--	--	1
54.	Nicobar pigeon (*Caloenas nicobarica*)	Chidiyatapu, Port Blair	Ahmedabad	42
55.	King cobra (*Ophiophagus Hannah*)	Pilikula	Bangalore, Mammalapuram	35
56.	Water monitor (*Varanus salvator*)	Chidiyatapu, Port Blair	Mammalapuram	40
57.	Painted roof turtle (*Chrysemys picta picta*)	Kukrail	Mammalapuram	2
58.	Himalayan salamander (*Tyletotriton verrucosus*)	Darjeeling	--	
59.	Malabar giant squirrel (*Ratufa indica*)	Pilikula	Chennai, Pune	
60.	Malabar grey hornbill (*Ocyceros griseus*)	Kodanadu (Kerala)	Hyderabad	
61.	Malabar pied hornbill (*Anthracoceros coronatus*)	Kodanadu (Kerala)	Hyderabad	