

Research Action Plan: West Bengal Zoo Authority

1. Introduction:

Despite early menageries being the source of much useful biological information on anatomy and taxonomy, it is only more recently that the potential for research in zoos has been recognized. Collections of captive animals are unique and irreplaceable resources for conservation; but without research in zoological parks, progress in conservation science would diminish. There is a flow of information from zoo researchers to field scientists that assists in providing new insights into species biology. Reciprocally, data collected in the field enhance efforts in captive breeding. The new research initiatives undertaken in zoos, are in the fields of reproductive and genetic technologies, and highlight their significance for conservation and management of threatened species. It is evident that zoo research has a vital role in linking

in situ and *ex situ* conservation. This role needs to be expanded and developed to meet the challenge posed by expanding human and declining wildlife populations and ecosystems. **Zoo research aims to be benign, non-invasive and non-intrusive and currently focuses mainly on issues of conservation of biodiversity and animal welfare and husbandry.**

Good research produces a well-validated body of knowledge based on internationally accepted principles and suitable for sharing. The research may be performed by a zoo's own staff, and/or by students, trained volunteers or professional research partners. **Overall, the most important aspects of the knowledge gained from zoo research concern conservation of wild species and habitats and the health and welfare of individual wild animals or populations.**

Research results are particularly valuable in terms of identifying, characterising and solving problems and in prioritisation and decision-making for conservation, animal welfare or other purposes, including education and public relations. Zoo research can play a vital part in the expansion of scientific knowledge on many fronts and be transferable in far wider contexts, including wildlife management in the field. Methods of safely anaesthetising rhinos in natural habitats were, for example, first developed in zoos and safari parks.

Zoo research possibilities are practically endless and can, for example, extend to benign, non-intrusive studies involving concepts in engineering and mathematics, e.g. biomechanical or biomaterials studies of flight (aerodynamics), navigation and migration in bats, birds and insects; or of swimming (hydrodynamics) in mammals, reptiles, frogs, fishes and invertebrates. Not all zoo-based research has to be immediately and obviously 'practical' or driven by prior hypotheses.

Core subject matter: Basic and applied research programmes in zoos or aquariums can embrace a remarkably large number of topics including: animal care, ageing, assisted reproduction, behaviour, bioinformatics, bio-materials or 'gene' banking, biotechnology, contraception, database management, diet, disease, DNA analysis, domestication, environmental enrichment, husbandry, identification, life histories, low temperature biology (cryobiology), parasites, population analysis, reproduction, studbooks, human behaviour, visitor studies and wildlife crime.

Research efforts on these topics will, in turn, typically draw on combinations of major scientific disciplines such as anatomy, anthropology, biochemistry, biogeography, bioinformatics, biotechnology, ecology, education, endocrinology, ethnology, ethology, evolution, forensics, genetics, genomics, information technology, nutrition, parasitology, pharmacology, physiology, population biology, psychology, sociology, taxonomy and veterinary medicine.

As well as observational data, a wide variety of materials and methods may – subject to risk assessments, bio-security and health and safety precautions – be utilised in studies of living zoological collections and associated products (e.g. tissue and blood samples, faeces, urine, bones, eggs, nests and feathers). For example, some substances such as hormones contained in faeces and urine are important in non-invasive studies of stress. All animals die eventually, and post-mortem material can be usefully studied and be deposited in museums and universities for future reference; especially material from threatened species.

Equally important are the computerised records and archives that zoos and aquaria maintain on breeding, e.g. parentage, clutch/litter size, inter-birth interval, infant survival, group composition, behaviour, medical issues etc. Being zoological gardens, there is an increasing engagement with botanical and horticultural research, seed banking and the breeding and management of rare and endangered species of plants, which follows the Global Strategy for Plant Conservation.

Productive and inventive zoo research is also characterised by the inter-linking or cross-over of disciplines, the application of a wide range of new technologies, such as 'DNA fingerprinting' and electronic micro-chipping for species identification, cryobiology to create a gene-bank or 'frozen zoo', faecal hormonal analysis to determine levels of stress, use of blood-sucking ticks to obtain small blood samples and NMRI scanning as a non-invasive means of assessing an animal's health status.

Value in zoo management: As emphasised in Building a Future for Wildlife (WAZA, 2005): *'Research is a tool to assist in doing any activity better'*. Zoos and aquariums provide a unique setting for high quality investigations in basic and applied science. Research initiatives may often concern conservation but can also produce a wide range of other information on which to base rational management decisions. It is estimated by the International Species Information System, ISIS, that at least 10,000 animal taxa are maintained in zoological collections worldwide, with species of fish

and invertebrates still substantially undercounted. Collection managers and fieldworkers frequently identify 'gaps' or shortcomings in essential biological information on species. Research is needed to remedy this situation. Examples of high priority biological research targets are: ***species extinction crises; management of small threatened populations, both in situ and ex situ; understanding of human impacts on biodiversity (including through climate change) and how to reduce them; reintroduction programmes; restoration of damaged habitats; education assessments to improve public attitudes – now including studies on 'conservation psychology' and new methods for the promotion of awareness of conservation and other scientific issues.***

Research allows zoos to identify and characterise problems experienced in the fields of animal husbandry and welfare and to accurately assess and predict conservational impacts of activities. Potential solutions to real problems can result and research also allows for the objective measurement and evaluation of the effects of implementation of management changes.

Zoos benefit directly from research, as results can often be immediately applied in a practical context such as in husbandry, contraception, reproduction, population management, health and ageing; and in assessing the effectiveness of educational tools and methods. Research, in its broadest context, can also be usefully applied to socio-economic aspects of running a zoo such as sustainability, recycling, visitor attendance and focus, spending patterns, communications, marketing and public relations exercises. Assessing the effectiveness (or not) of specific conservation measures is a vital and challenging area of research.

Zoos certainly conduct important ex situ work including scientifically managed 'assurance' breeding programmes, affording the potential for reintroduction of species that have become extinct in the wild. While the scale of conservation problems and the research needed can sometimes be overwhelming, it is important to note and celebrate success. For example, the European bison has been brought back from the brink of extinction to more than 1,800 animals as a direct result of scientifically managed zoo breeding programmes and reintroductions to eastern Europe.

Wider needs and benefits: As well as underpinning practical or applied science, zoo research can make a general, perhaps major contribution to fundamental or theoretical knowledge. Often problems or 'symptoms' observed in everyday animal management can only be solved if basic research is first carried out on several aspects associated with the problem. For example in order for a good diagnostic test to be developed for a particular disease, the basic research on genetics, taxonomy or life cycle of the causal pathogen and its host may be necessary. Again, in order to address a shortage of potential breeders in a breeding programme, basic research into the social dynamics and reproductive strategies of the species may be required.

New research approaches are needed to address other emerging needs in a rapidly changing world. For instance, the Strategy recognises compelling scientific evidence that global climate change is occurring, exacerbating threats in nature and already having deleterious impacts on wildlife. As a necessary strategic consequence, many new species will likely have to be brought into zoological collections for conservation breeding, to add to those already in care and which are being studied. Examples of investigations relevant to addressing the biology of climate change include temperature-dependent sex determination in animals, the effects of changed seasonality on food availability and foraging strategies, health and reproduction and survivability and temperature tolerance in animals and plants. It is also important that zoos help monitor the impact of climate change and other potentially deleterious factors on exotic and indigenous species within their own local environment, in line with the 'Agenda 21 initiative' linked to the Earth Summit and Rio Declaration on sustainable development and the conservation of biodiversity.

Research should, for example, also be used to help determine and monitor wildlife diseases, including emergent infectious diseases such as Severe Acute Respiratory Syndrome (SARS) and avian influenza; which may also be zoonotic (communicable to and from humans). Research results should, in addition, be used to derive 'coping strategies' for the appropriate treatment, care and biosecurity of animals threatened with disease. An example here is the current amphibian extinction crisis – evidently caused in large part by the potentially lethal chytrid fungus (*Batrachochytrium dendrobatidis*) – being addressed as part of a global partnership, the Amphibian ARK.

Fundamental research may be conducted by the zoo or aquarium alone, or done in cooperation with external academic research establishments. Whatever the case, such research often brings added benefits above and beyond the formulation of potential solutions to immediate practical problems in zoos and aquaria.

High-quality research published in international, refereed journals brings credibility to the zoo or aquarium. It will develop a good reputation as a serious institution that makes sound, science-based decisions. Unlike universities, zoos are not typically subject to formal research assessment exercises and the use of citation analysis to help determine the quality of published research output. However, this method of assessment may be brought in at some point under the European Zoos Directive. Funding support for research projects proposed by such zoos may more easily be obtained through external research grants and other science subsidies. Equipment bought and facilities installed for the research project become physical assets and often bring wider benefits to the zoo's operations above and beyond the research project they were initially obtained for. Zoos that make a substantial general contribution to scientific knowledge will inevitably have a stronger public position and theoretical knowledge. Often problems or 'symptoms' observed in everyday animal management can only be solved if basic research is first carried out on several

aspects associated with the problem. For example in order for a good diagnostic test to be developed for a particular disease, the basic research on genetics, taxonomy or life cycle of the causal pathogen and its host may be necessary. Again, in order to address a shortage of potential breeders in a breeding programme, basic research into the social dynamics and reproductive strategies of the species may be required.

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2. Research Action Plan:

***Zoo and aquarium research objectives should be 'SMART' i.e. specific, measurable, achievable, realistic and time-bound.
(EAZA Research Strategy, 2008)***

Research in Zoos aims at (1) new knowledge to help the institution achieve its goals- research on husbandry, visitor preferences, educational and interpretation methods, conservation approaches etc. to a greater or lesser extent depending on the zoos goals and objectives. and (2) research that is undertaken in a zoo by others to achieve their own goals, without being inconsistent with those of the organization- providing access to or materials from non-domesticated species for comparative analysis.

The main Research goals:

- a) Research in pure and applied biological science (including small population biology, animal welfare, wildlife medicine, physiology, nutrition, behaviour, reproductive biology, genetics, evolution and taxonomy).
- b) In-situ conservation research (e.g. field based ecological and habitat research).
- c) Research aimed at identifying and improving zoos and other ex-situ facilities operations (e.g. research on visitor learning, the effectiveness of exhibits and programmes, marketing and messaging, membership, and development and fund raising).

Research Strategy: Each zoo will:

- a) Participate in research works.
- b) Identify and pursue its own research policies and priorities.
Institutions should have a written research policy that should identify research priorities based on their animal collection and current resources present within that particular institution.

- c) Develop an infrastructure, equipment and allocate sufficient staff time for research, taking into account the policies and priorities of other conservation and research agencies.
- d) Link research activities and policies to the regional and institutional animal collection planning process and the relevant activities of others.
- e) Increase the dissemination of research plans, news and results.

Parameters under which Zoos/Deer Park/ Rescue Centres can conduct research.

The Guidelines for facilitating effective and scientific management of zoos in India in consonance with Rule 10 of Recognition of Zoo Rules, 2009 (Amendment) Rules 2013, in Rule 10, Schedule 10 mentions about the research activities to be taken up by ex-situ facilities:

- i) Every zoo shall make arrangement for recording in writing, the detailed observations about the biological behaviour. Population dynamics and veterinary care of the animals exhibited, so that a detailed database could be developed.
- ii) Every zoo shall make arrangements for meticulous recording of the physical activity of the animal viz. Infighting, inter group responses, feeding, mating and reproductive behaviour. Detailed record of the health of the young ones including congenital abnormalities and mortalities shall also be kept. The data so collected shall be shared with identified institutions for detailed analysis and evolving the strategies for increasing the longevity, maintaining the genetic and behavioural viability and enhancing the reproductive potential of endangered species housed in zoos.
- iii) The data regarding the healthcare and nutrition provided to the animals shall also be regularly monitored and collated for assessing the quality of life being provided to the zoo animals. Data regarding the quantity of feed consumed by the animals shall also be compiled. The aforesaid data shall be shared with national Referral Centre as per the direction of the Central Zoo Authority for improving the veterinary protocols and developing new feeding schedules.
- iv) The zoos shall also endeavour to compile the data regarding the efficacy of their drugs and vaccines administered to the animals and share it with the national Referral centre and other eminent institutions working in the field to get their inputs regarding more effective drugs and vaccines.
- v) The zoo shall continue to endeavour for identifying the efficacious and easily implementable methods for controlling the population of prolifically breeding species such as putting implants and hormone therapy and use of other suitable methods.

- vi) Each zoo shall endeavour to keep a detailed record of the effectiveness of the animal enclosures in providing the animal's desired quality of life and the satisfaction provided to the visitors in getting unobstructed view of the animals. The observations made by visitors in this regard should also be compiled. The data so collected shall be analysed and made available to the Central Zoo Authority for upgrading the designs of the enclosures.

- vii) Every zoo shall keep the record of the quantity of water, electricity and other sources of energy being utilized in upkeep and maintenance of the animals of various species. The data shall also be shared with the Central Zoo Authority to enable them to evolve a strategy for optimum utilization of resources.

- viii) All the zoo personnel shall endeavour to publish their scientific observations on different aspects of zoo/animal management in the relevant local/national /international journals and periodicals for dissemination and up - gradation of existing knowledge on ex-situ conservation techniques.

PROGRAM 1

Animal Nutrition

Objectives

Investigate wild and captive animal diets of key species as part of the veterinary preventative health program and to investigate the quality of the browse and other dietary items fed to Zoo collection animals in order to provide the best nutrition possible. Investigate disease conditions that have arisen from nutritional disorders.

Background

Nutrition provides the corner stone to the delivery of healthy and reproductively active animals, both in the wild and captive setting. Although the understanding of nutritional requirements in wildlife has developed significantly, detailed nutritional understanding of wildlife and the implications for optimum physical and mental health and reproduction remains in its infancy. The supply of optimum nutrition and the understanding of wild diets is a complex area and regularly initiates research topics for staff, students and researchers.

➤ **Proposed Activities:**

- a) Develop a focus group of specialists in the field of nutrition to meet regularly to discuss and promote the study of zoo nutrition projects/problems.
- b) Promote study of small-scale nutritional issues by keeping staff (in conjunction with Veterinary staff).
- c) Investigate wild diet.
- d) Promote the most urgently required investigations as research projects.
- e) Database management of nutritional information.
- f) Vitamin supplementation and diet reviews for breeding enhancement for priority species.

➤ **Zoos/Deer Park /Rescue Centres earmarked for the Activity:**

- 1) North Bengal Wild Animals Park, Siliguri
- 2) Zoological Garden, Alipore
- 3) Padmaja Naidu Himalayan Zoological Park, Darjeeling.
- 4) Deer Park/Rescue Centres.

- #### ➤ **Species concerned:** Brow antler deer (*Rucervus eldii eldii*), Black buck (*Antelope cervicapra*), Bhutan Grey Peacock Pheasant (*Polypelectron bicalcaratum*), Swamp deer (*Cervus duvauceli*), Mouse deer (*Tragulus meminna*), Himalayan Monal (*Lophophorus impejanus*), Red Panda (*Ailurus fulgens fulgens*), Snow leopard (*Uncia uncia*), Common leopard (*Panthera pardus*), Royal Bengal Tiger (*Panthera tigris tigris*), Asiatic lion (*Panthera leo*).

Hog deer (*Axis porcinus*).

➤ **Works to be taken up for these species.**

- 1) Standardization of feeding chart: Questionnaire survey on the feed, feed items and quantity, feeding pattern, enrichment, consumption etc. The survey shall help gathering data's of the species concerned. The data can be analysed with assistance from group of specialists in the field of nutrition to formulate a standardised feeding chart.
- 2) Feed preparation and presentation (Feeding Enrichments)- Observation and Analysis. Study of their wild diets.
- 3) Feed recording: Preparation of feeding chart, recording and analysis of (Consumption /leftovers/dislike etc),
- 4) Qualitative and Quantitative analysis/collaboration with Indian Veterinary Research Institute, Wildlife Institute of India, Indian Institute of Chemical Biology and **G.B. Pant National Institute of Himalayan Environment & Sustainable Development** – Nutritional analysis (feed/fodder)- Mg, Ca, Zn, Fe, Na, Crude Protein, ADF, NDF, Lignin./ seed germination from scat.

PROGRAM 2

Reproductive biology

Objectives

The key objective of the Reproductive Biology Program is to investigate the nature of, and assist with where appropriate, the reproduction of key species in the Zoo animal collection.

Background

Captive facilities have an excellent track record in producing animal off-spring by natural mating for both display at Zoos and release in to the wild. The systematic investigation of reproductive cycles will help increase the efficiency of mating since the basic reproductive physiology of many native and exotic animals is unknown. The development of assisted reproductive technologies will aid the reproduction of those species that do not mate readily in captivity.

Proposed Activities:

- i) Investigate the reproduction of threatened species or species of particular animal management interest.
- ii) Develop research projects on Reproductive issues.
- iii) Pursue artificial reproduction techniques for conservation breeding species.
- iv) Regular hormonal analysis of the species concerned.

Species concerned: Brow antler deer (*Rucervus eldii eldii*), Black buck (*Antelope cervicapra*), Bhutan Grey Peacock Pheasant (*Polyplectron bicalcaratum*), Swamp deer (*Cervus duvauceli*), Himalayan Monal (*Lophophorus impejanus*), Red Panda (*Ailurus fulgens fulgens*), Snow leopard (*Uncia uncia*), Common leopard (*Panthera pardus*), Royal Bengal Tiger (*Panthera tigris tigris*), Asiatic lion (*Panthera leo*). Hog deer (*Axis porcinus*), Asiatic Black bear (*Ursus thibetanus*), Indian pea fowl

➤ Works to be taken up for these species.

- 1) Behavioural Observation- breeding biology (season, compatibility, mating behaviour, oestrus period, oestrus detection, pregnancy detection gestation period, birth, litter size, nursing behaviour, post partum behaviour,).
- 2) Androgen and stress hormones could be monitored using Blood, urine and faecal samples
- 3) Pheromone signalling in mammals.

Collaboration with Laboratory for the Conservation of Endangered Species (LaCONES), Centre for Cellular and Molecular Biology,

Hyderabad, National Centre for Biotechnology Information and various universities.

PROGRAM 3

Captive management

The objective of the Captive Management Program is to underpin decisions relating to the captive management of the diverse Zoo animal collection with sound scientific knowledge.

Background

Captive management of wild animals presents many challenges. Non-domestic species often do not thrive in the captive environment and traditionally we have used both formal and anecdotal methods to gather information and apply the best quality thinking possible to managerial decisions. Often the challenges need immediate resolution and we are unable to take advantage of students as a resource due to the need to schedule their work. In these cases we often use staff and volunteers with varying levels of expertise to gather information to assist in decision making.

The advent of behavioural enrichment has set new challenges to ascertain natural behaviour patterns and work to create captive environments to replicate those patterns. In so doing abnormal behaviours are minimised and "normal" psychology is promoted. Animal exhibit design has a substantial influence on behavioural repertoire as well as visitor experience; both are enhanced where a naturalistic approach is taken. There is need for DNA level genetic exploration to ensure that captive populations are representative of the heterozygosity found in wild populations if these are to become useful reservoirs for endangered species.

Proposed activities:

- a) Conduct scientific investigations into the behaviour of Zoo collection animals.
 - b) Advance knowledge of the husbandry requirements of Zoo collection animals.
 - c) Research the genetics of, and evaluate the heterozygosity.
 - d) Collaborative genetic studies for captive breeding and release programs.
- Research on Captive management applies to all the animal collection in respective zoos /deer parks and rescue centres.

Works to be taken up:

- 1) Species Specific Enrichment research works for all groups of animals – Carnivores, lesser carnivores, Birds, primates, reptiles, herbivores and amphibians: Physical, social, sensory, feed etc enrichments experiments can be carried out for various species concerned followed with pre and post enrichment observations and analysis.
- 2) Behavioural observations on different captive animals. : behavioural observations to be conducted towards **monitoring stereotypy, behavioural diversity and feeding.**

- 3) Record keeping –ZIMS/Sparks/PM 2000- pedigree analysis, breeding recommendations, kinship value, age-sex structure etc. Manual record keeping and analysis (preparation of animal inventory)/animal history card, Treatment card, daily reports, keepers diary, Post mortem reports, feed records etc.
- 4) Studying heterozygosity of captive stock/conservation breeding species (inbreeding coefficient, variability). Collaboration with Laboratory for the ***Conservation of Endangered Species (LaCONES), Centre for Cellular and Molecular Biology, Hyderabad, National Centre for Biotechnology Information, Indian Institute of Science Education and Research (IISER) and various universities.***
- 5) Development of Disaster Management Plan.

PROGRAM 4

Wildlife Management and Conservation

The objectives of the Wildlife Management and Conservation Program are to underpin decisions and actions taken to conserve or manage a species with sound scientific knowledge. This underpinning research includes adding to the body of scientific knowledge concerning the reproductive biology, natural behaviours, ecology and threatening processes leading to a greater understanding of and/or improved conservation of, the earth's biodiversity.

Key areas of interest in this program include the captive breeding for release of threatened fauna with the associated research into the biology, behaviour and ecology of these species.

Background

Zoos in particular for many years had a high level of participation in captive breeding for release in the wild. These programs not only provide founder animals for new populations in the wild but also provide the opportunity to study these often little-known animals in more depth. These studies not only advance our knowledge of the species but also results in improved husbandry and breeding management.

Proposed Activities:

- a) Conservation breeding programme of endangered species.
- b) Scientific investigation for ex-situ conservation.
- c) Scientific investigation for in-situ conservation.

Planned Conservation breeding of critically endangered wild animals species is one of the aspects of scientific management of zoos. The West Bengal Zoo Authority has taken up a number of Conservation Breeding Programmes for critically endangered wild animal species in the state of West Bengal.

The Authority is managing or providing financial and technical assistance to following different Conservation Breeding Centres in the state:-

1. Conservation Breeding Centre, Birch Hill (Darjeeling) for Red Panda and Snow Leopard
2. Conservation Breeding Centre, Dowhill , Darjeeling for high altitude Pheasants and Herbivores
3. Conservation Breeding Centre, Topkeydara, Darjeeling for Red Panda and Snow Leopard

4. Conservation Breeding Centre, Alipore, Kolkata for Fishing Cat and Manipur Dancing Deer
5. Conservation Breeding Centre, Jaldapara, Dist. Alipurduar for Swamp Deer & Sambar Deer
6. Conservation Breeding Centre, Bhagwatpur, Dist. South 24 Parganas for Salt Water Crocodile
7. Conservation Breeding Centre, Sajnakhali , Dist. South 24 Parganas for Batagur Terrapin (Batagur baska)
8. Conservation Breeding Centre at Rajabhatkhaua, Dist. Alipurduar for Vulture
9. Conservation Breeding Centre at Kunjanagar, Dist. Alipurduar for Hog Deer (to be established)
10. Conservation Breeding Centre , Jaldapara, Dist. Alipurduar for Pygmy Hog (to be established)

Works to be done:

1. Identification of species for Conservation Breeding:
2. Study of animal ecology: animal biology and behaviour.
3. Ex-situ- In-situ linkage study: habitat identification, vegetative (flora) and faunal, population estimation, threat analysis
4. Planned breeding, restocking, and monitoring: Development of species specific restocking/reintroduction protocols.

PROGRAM 5

Health and Diseases Management

The objectives of the Health and Disease program are:

- a) To promote the study of disease in Zoo collection animals, particularly those that relate to preventative health, bio-security and the conservation of threatened species
- b) To act as a focus for communication with external agencies for collaborative research efforts in this area.

Background

The investigation of health and disease issues has long been a priority at Zoos; as such investigations are instrumental to maintaining the well-being of the collection animals. This research area focuses on preventative health strategies, in addition to disease investigation.

Proposed activities

- a) Parasitology: to Investigate the pathogenesis and transmission via serological surveys of current collection and any newly-borns.
- b) Bio security: Develop quarantine protocols/policies.
- c) Disease Investigations

Works to be conducted

- Routine stool investigation
- Species cycle study
- Study of soil/water micro flora and micro fauna of various enclosures.
- Vaccination study for certain species – Red Panda (*Ailurus fulgens fulgens*)
- Stool/ Blood culture works.
- Development of protocols for deworming and vaccination.
- Development of protocols for various disease outbreaks (preventive measures).

PROGRAM 6

Education and Communication:

All zoos/deer Parks/Rescue centres

Proposed activities:

- Preparation of pamphlets, brochure, guidemaps , guidebooks, posters, stickers for developing a concept on wildlife among the visitors
- Interactive sessions both in the zoo and out reaching (Birthday celebration of various animals)
- Arrangement of events like photographic event, birding, lepidopteraetc
- Hand to hand participation in preparation of enclosure enrichments like nutritional enrichment establishmen within the enclosure
- Seminars and workshops
- Celebration of various days and awareness march
- Sit and draw, speech, essay writing etc
- Engagement of interns from national and international level
- Zoo volunteers from different school and colleges against the issue of certificate of participation
- Summer camps for school children
- Enrichment of zoo scientific literature database and scientific publications.
- Interactions with specialists for work manifestation
- Half yearly report and advances to be made public by the means of various electronic media
- Communication cell for enthusiasts
- Adoption program
- Scientific progress in the fields of both flora, fauna and their interactions.
- Directors message (to public through media)
- Mobile app development for zoo animals for easy reach to general public for all mobile platforms.

NOTE:

For carrying out this research action plan ahead following are the issues that needs to be addressed:

- ✓ **Evaluation of the following Zoos/Deer Parks/Rescue Centres**
 1. Zoological Garden Alipore.
 2. Padmaja Naidu Himalayan Zoological Park, Darjeeling
 3. North Bengal Wild Animals Park, Siliguri
 4. Junglemahal Zoological Garden, Jhargram
 5. Sunderban Wild Animals Park, Jharkhali
 6. Bardhaman Zoological Garden, Golapbaug
 7. Rasikbeel Mini Zoo, Coochbehar
 8. Surulia Mini Zoo, Purulia
 9. Garchmuk Deer Park, Howrah
 10. Adina Deer Park, Malda
 11. South Khairbari Rescue Centre, Alipurduar.

- ✓ **Research Budget of West Bengal Zoo Authority**

A separate research fund needs to be allocated for conducting various research works laid down in Program 1-6.

- ✓ **Signing of Memorandum of Understanding (MoU) with- Research facilities, Universities and Zoos.**

**FORMAT FOR SUBMISSION OF RESEARCH PROPOSAL TO WEST BENGAL ZOO AUTHORITY
SMALL GRANT RESEARCH FELLOWSHIP
(TO BE FILLED BY APPLICANT)**



1. Project Title:

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2. GENERAL INFORMATION Date of application:
Name of the Zoo organization:
Contact person/ project leader:

3. CLASSIFICATION OF PROPOSAL
Improvement of the Zoo Scientific Management Ex-situ Conservation Welfare of the animals
Any other, please specify

.....

4. DATE OF INITIATION OF THE PROJECT

5. DURATION OF THE PROJECT

6. LOCATION OF THE PROJECT.

Region /State:
Closest main city:

7. STAFF INVOLVED IN PROJECT (please include Curriculum Vitae of the individuals):

1. Name (+ title) + Zoo/Organization.....
 Period to be spent on the project from: to: (day/month/year/) for
 hours/week
 Role / Function in the project:

2. Name (+title) + Zoo/Organization: Period to be spent on the project from: to:
 (day/month/year/) for hours/week
 Role / Function in the project:

3. Name (+title) + Zoo/Organization: Period to be spent on the project from: to:
 (day/month/year/) for hours/week
 Role / Function in the project:

8. PROJECT PROPOSAL
- 8a. Background and history of the project (max. 300 words)

8b. Main problem or question (max 200 words)

8c. Aims and objectives of the project (max 200 words)

8d Methodology and/or proposed activities (max 300)

9. COLLABORATION (IF ANY): Please specify with which institutions/organisations will collaboration take place and type of the collaboration & support should also be indicated.

	NAME	LOCATION
NGO's		
Ministries		
Universities		
Research institutes/ or any other		
Type of the collaboration and support.....		

9a. Support from host zoo: (Please specify what support the host zoo will be providing, it could be in the form of laboratory, equipment, space or personnel).

10. BASIC TIMESCHEDULE

11. OUTPUT

11a. Describe which output can be expected from this project (reports, (scientific) publications, management plans, educational tools, etc. etc.) and how they will be disseminated.

11b. Describe the (practical) relevance of this project for ex-situ conservation and scientific management of animals in general

11c. Describe how results/output will be evaluated (timelines and benchmarks)

12. FEASIBILITY (How well is the execution of the project guaranteed? Possible risks such as logistics, permits, other finances and how are these risks dealt with).

13. FINANCIAL ASPECTS (please include budget overview (in Rs.) in an appendix)

14. DECLARATION The information submitted in this application is true, to the best of my knowledge. Should any significant developments arise after this application is made, I shall notify the Member Secretary, West Bengal Zoo Authority.

15. SIGNATURE Research Chief Wildlife Warden/ Officer-In-charge of the Zoo Municipal Commissioner/ (Supervisor of the Research) Owner/Zoo Operator

**Director/Asst. Director
(Investigator)**

**Zoo Biologist
(Co-Investigator)**