A REVIEW OF CURRENT RESEARCH ACTIVITIES IN INDIAN ZOOS

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ABSTRACT

This paper examines the current trend in research activities in Indian zoos based on the categorization of a selected number of articles (311) that have appeared in ZOOS' PRINT for the past 11 years (1986-1996). Results reveal that publications on veterinary medicine alone formed 37% of the disciplines, closely followed by reproduction (22.5%) and management (17%). Contributions from other disciplines such as behaviour, education and exhibitry are very insignificant. The reasons for this substantial proportion of publications on veterinary medicine and reproduction is attributed to the general practice of research being considered a part and parcel of the veterinary department. Lack of trained staff, time, funds and lack of motivation may be reasons for zoos being unable to do quality research. There appears to be 2 options for solving this situation: (1) developing an in-house team of researchers and/or (1) inviting researchers from outside institutions for doing research. The benefits of these options are being discussed in this paper citing examples from some Indian zoos.

INTRODUCTION

Zoos are living laboratories with animals of different taxa and ecological requirements being maintained in a single facility. Zoos, therefore, provide a special opportunity for researchers to conduct studies on exotic species not often available in free living and laboratory conditions (Kleiman, 1992). In spite of such opportunities, many zoos in India have not recognized the need to conduct even basic biological research, leave alone organized systematic research. It may not be an exaggeration to state that many zoos started to cultivate the habit of submitting articles, and subsequently do some systematic observations for preparing an acceptable manuscript, after the launching of journals like the ZOOS' PRINT. Coupled with this, the commencement of the Central Zoo Authority (CZA) in 1991, many captive facilities that were working in isolation have been made to realize the recent developments taking place in the field of zoo sciences.

With the CZA's guidelines on the standard of animal facilities and management being made mandatory for all these captive centres, there is no doubt that many glaring inadequacies have come to the surface during their inspection programmes. There are zoos which do not maintain records, an essential prerequisite for compiling data for basic research on life history para-meters like fecundity, juvenile/adult mortality, age at sexual maturity, diseases, diet, oestrous cycle, breeding season, gestation period etc. This had been the case even in some Western Zoos in the past. In 1975, the American zoo community sponsored a special symposium to explore the wisdom of conducting zoo research (ILAR, 1975)!

More than 5 years after the institution of CZA, the Wildlife Institute of India is now conducting a series of regional-level consultation workshops for identifying and prioritizing research needs in Indian zoos. This author, who had the unfortunate experience of failing to reach in time to the venue of one of these workshops, realized the need to investigate into the current research activities in Indian zoos.

SOURCE OF MATERIAL FOR ANALYSIS

The most important part of this exercise was to organize all the research publications that have come from various Indian zoos. Articles published in ZOOS' PRINT during the past 11 years (1986 to 1996) formed the materials for this investigation. Articles were collated according to their discipline and analyzed for their proportion of contribution. The results were assumed to provide an indication of the current trend in zoo research in Indian zoos.

Research publications from Indian zoos have appeared in ZOOS' PRINT, International Zoo Yearbook, Indian Veterinary Journal, Indian Journal of Animal Sciences, Journal of Bombay Natural History Society, Animal Keeper's Forum, International Zoo News, Zoo Biology and many other periodicals. Even though articles on zoo-based research still continue to be published in other journals also (Acharjyo *et al*, 1996), ZOOS' PRINT was chosen because it is the single most important periodical for Indian zoo personnel to publish and disseminate information irrespective of their discipline.

Articles considered for this analysis included papers on original research, reviews and conference proceedings. The review did not include articles reprinted in ZP, articles published by foreign authors and articles published by Indian authors during their work abroad. Popular articles, descriptive reviews, species status reports and commentaries were not included. Articles on free living wildlife were also not considered for this analysis as it fell beyond the objective of this exercise.

CONTRIBUTIONS FROM VARIOUS DISCIPLINES

After a process of filtration, 311 articles published in ZOOS' PRINT between 1986 and 1996 qualified to be designated as scientific articles for this analysis. Publications on veterinary medicine (diseases, treatment, parasitology, pathology, haematology, etc.) contributed to 37% of the publications. This was followed by articles on reproduction (22.5%), management (17%), animal behaviour (7.7%), visitor behaviour and education (4.8%), conservation (4.2%), exhibtry (2.25%) and others (4.5%) (Figure). Others include articles on genetics, nutrition, anatomy and physiology.

Hand-rearing represented 41% of the articles published on management and captive breeding represented 74% of the articles on reproduction. Apart from articles on visitor behaviour, education contributed to only 2.25% of all articles published in ZOOS' PRINT.

Of the 311 publications, only 8% could be considered serious research publications, i.e. studies done with a preplanned

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set of objectives, standard methodologies and adequate sample sizes.

WHY MORE VETERINARY ARTICLES?

If time is a major constraint for zoo directors, rangers, horticulturists, zoo educators and other staff for doing research or even to write articles on life history parameters, it is indeed a surprise to note that zoo veterinarians have a better record of publication (37% in this analysis). If few of the articles on anatomy, physiology, nutrition and genetics (most of which were published by veterinarians) were to be included to this, the proportion would go upto 40%. This figure is apart from the articles published in various veterinary journals by zoo veterinarians.

The reason for a substantial proportions of veterinary articles lies in the fact that all matters relating to zoo research have been mostly bestowed upon the veterinary department because of their facilities to do laboratory and analytical procedures. This wisdom of granting the research aspects to zoo veterinarians lies in the misconceived belief that zoo research is all about diseases, reproductive biology, nutrition, physiology and captive breeding. Most of these disciplines which are still looked after by zoo veterinarians as many Indian zoos are yet to realize the need to have separate departments for biology (reproductive and conservation), animal nutrition, education and horticulture (Ashraf, 1996). Another reason for an increased number of publications from zoo veterinarians could be due to the nature of their job: exotic animal medicine. Very often, an article on some elementary surgical procedure (like castration, vasectomy etc.) performed on exotic species gets accepted for publication because of its uniqueness.

BEHAVIOURAL RESEARCH INADEQUATE

Despite the tremendous potential zoos have for doing behavior studies of excellence in zoos (Kleiman, 1992), it is surprising to find that only 7.7% of articles published in ZOOS' PRINT were on animal behaviour. More so because behavioral research is relatively inexpensive when compared to other disciplines. A similar type of analysis of disciplines represented in the journal of Zoo Biology from 1982 to 1990 revealed that behavioral research contributed to 28% of the articles published. The reason could be the same customary practice of handing over research problems to veterinarians who are not well versed with behavioral studies, particularly those on behavioural ecology. However, the trend appears to be changing with 95% of these 7.7% articles on behaviour being published after 1990. Kleiman (1992) in his excellent article on behavioral research explains how studies on parental care, intersexual aggression, mating system and dispersal pattern are essential to understand the cause of injuries and deaths that occur within a group of animals from time to time. This calls for a change in our customary trial-and-error practice of removing and introducing individual animals into an established group.

CONTRIBUTION FROM OTHER DISCIPLINES

The situation on research on visitor education is equally disappointing. This is also not surprising considering the fact that the need to educate the zoo visitors has not been realized in most Indian zoos. No more than 2 or 3 zoos out of the nearly 200 Zoological Park in India have an education officer (Walker, 1992) and probably none have an exclusive education department !

Most of the articles on exhibit designing have appeared in ZOOS' PRINT during 94-96. Since most of the outdoor exhibits for mammals look monotonous because of the standard practice of creating island type exhibits without any meaningful furnishings (Ashraf, 1996), it is not surprising to see that zoos have not found anything atypical to be observed about the exhibits. The same reason could be attributed for lack of articles on enrichment research. Opportunities to do enrichment research will arise only when zoos begin modifying their enclosure designs, add new objects to the enclosure or change feeding schedules. Conversely, studies on the effects of environmental enrichment on behaviour has become a widely researched topic in Western zoos (Carlstead *et al*, 1993; Shepherdson *et al*, 1933).

Of the only 8% of the publications that were recognized as serious research articles during this investigation, only 24% were contributed by zoo personnel. The rest were conducted by outsiders mostly from universities and colleges. This shows the need for zoos to establish a rapport with the nearby universities, colleges and research institutions if they are thinking of doing systematic research, both basic and applied (see below).

WHY THIS INDIFFERENCE TO RESEARCH IN ZOOS?

Most zoo personnel do not seem to appreciate the need to systematically investigate into a problem or analyze and publish data that has accumulated over the years on various aspects of the natural history of a species. It appears that the fact that zoo research programmes are meant to improve animal husbandry and wildlife conservation (Thompson, 1993) has not been realized. Many zoos, particularly those which function in isolation, still consider hybridization as research. This was evident from an article published in ZOOS' PRINT in 1988 (on spoonbill-ibis hybridization) and from a few participants at the Zoo Management Course held at Mysore Zoo in December 1995. Research programmes in zoos have now come a long way from earlier notions of zoo research that even considered developing hybrids as research (Thompson, 1993).

Lack of trained staff, time and funds have often been cited as reasons by zoo personnel for not being able to do scientific research. In this context, it will be worthwhile to compare the situation prevailing in various Wildlife Sanctuaries and National Parks in India. No one can deny the fact that many of the research projects carried out in our protected areas are by research institutions and individuals with funding from various outside agencies. Only very few Tiger Reserves have full-time Research Officers and here too many of the posts are still vacant. With many pressing day-to-day management problems requiring urgent attention, wildlife managers have little time for doing systematic research (Karanth, 1996). Why can't a similar reasoning be attributed to zoos also?.

In a few exceptional cases, however, research works have

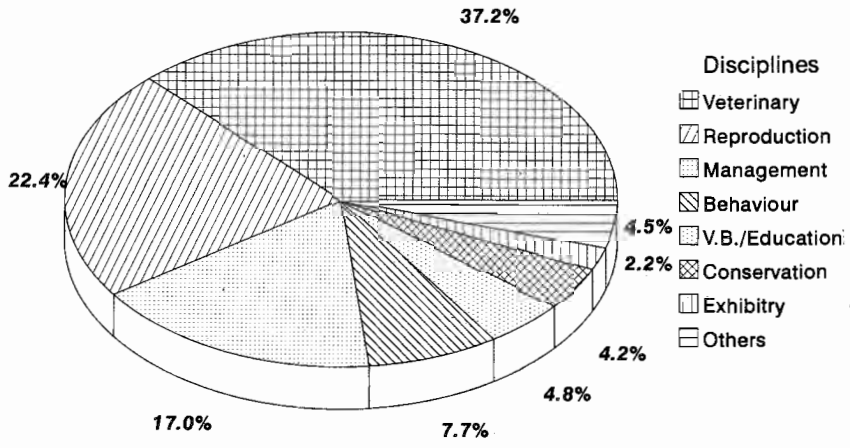

Fig. Proportion of articles on various disciplines which appeared in ZOOS' PRINT from 1986 -1996.

been carried out by managers in zoos and sanctuaries. In all such instances, the studies have often resulted solely as a result of an individual's strong interest and commitment. If zoos have to contribute to the scientific management of captive wildlife and thereby have a significant impact on wildlife conservation, they have to realize the need to do serious research continuously. Looking at estimates which indicate that nearly 2,000 vertebrate taxa will require captive breeding programmes to prevent their extinction (Soule *et al*, 1986), the need to initiate organized research becomes indispensable. Modern zoos will have to establish departments whose sole purpose is to conduct research (Benirschke, 1996).

A MULTIDISCIPLINARY RESEARCH TEAM?

Research activities carried out by certain individual zoo personnel cannot be taken as a regulation model to be followed by all zoos. Moreover, zoo research programmes are moving from reactive, trial-and-error approaches to scientific approaches with testable hypotheses and adequate sample sizes (Thompson, 1993) and these cannot be carried out in full by part-time involvement of curators, veterinarians and other zoo personnel. There appears to be two options if Indian zoos are to match the global standards of zoo research: zoos have to either (1) create a dedicated in-house team of researchers and/or (2) collaborate with a nearby institution.

In the first model, systematic research could be carried out by a separate research unit, headed by a full time Research Officer and assisted by a team of zoo personnel who are drafted into the unit from various faculties from time to time. The Madras Zoo is probably the only zoo in India which has a team of research biologists almost exclusively for this role. Even in this case, these Research Biologists are not regular employees of the zoo. It is an irony that research is given last priority in zoos. Even in this multidisciplinary research team model, an active collaboration with the nearby universities and institutes is essential for easy access to recent scientific publications so that many recent developments in biological theory and research methods can be refreshed from time to time.

The second approach of conducting research through scientists or research students from outside, can substantially save the time of zoo personnel who have other works to do. The best example for this active collaboration is the Nandakanan Zoo which has been producing quality publications in the veterinary field because of its long term association with the Orissa Veterinary College. Recently Assam State Zoo, Madras Zoo, Vizag Zoo and few others have also begun to realize this. A good example of research institutions taking part in zoo research is the involvement of the Centre for Cellular and Molecular Biology, Hyderabad in analyzing biological samples for DNA fingerprinting and cryopreservation studies (Singh, 1995; Walker, 1996; Shivaji, 1996). It remains to be seen whether such associations will continue forever or whether it is a result of some individual's interest.

It is a surprise that other research institutions, with centres of excellence in wildlife research like the WII, BNHS, IISc etc., have not shown any interest in doing zoo research. While it is true that zoos do not have trained personnel to do scientific research, it is also true that trained scientists do not find research on captive animals interesting. Collaboration with universities and other institutions will not only provide access to a wide range of expertise, but also result in an improvement in the quality of research and a greater likelihood of the findings getting published (Hardy, 1996). Moreover, some knowledge on research design, methods of data collection, statistics, theory and scientific writing are essential for ultimate publication of results (Hutchins, 1988) and there is little doubt that universities and other institutions have expertise in these areas.

With the formation of CZA, there is already a change in the attitude of many zoos towards their role in supporting *in situ* conservation efforts. However, it is an irony that the CZA's standards and norms for zoos do not clearly stress the need to conduct either basic and applied research to improve their animal management skills (CZA, 1992). It is also surprising to see that the CZA's Application Form for zoo recognition does not include a column on research activities. Hediger (1965) made this following statement 30 years before: "Scientific research is usually placed last in zoological gardens, if indeed it has any place at all". It is unfortunate that this situation still continues in Indian zoos.

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