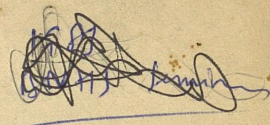


CAPTIVE BREEDING OF ENDANGERED CROCODILES IN INDIA CASE HISTORY AND FUTURE



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Following the initiation of the Crocodile Conservation project in 1975, all the three species of Indian crocodiles have bred in captivity — Gharial (Gavialis gangeticus) since 1981, the Muggers Crocodile (Crocodylus palustris) since 1978, and the saltwater crocodile (Crocodylus porosus) has not yet bred in captivity in any state project centres.

The conservation strategy adopted by the various state crocodile projects was to collect wild laid eggs for captive hatching and rearing, with the objective of restocking suitable protected crocodile habitats. By this method over 2500 Gharial, 700 s.w. crocodile and 5000 muggers have been reared and of which 855 Gharial, 500 s.w. crocodile and 700 muggers have been restocked in wild habitats, increasing the wild population manifold.

Captive breeding programmes with Indian crocodiles began in 1975 as a supplement to the main strategy and with an additional objective of finding out more on the reproductive biology of the species.

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It would be wrong to state that Indian Crocodiles have bred in captivity only following the Conservation project in 1975. Jaipur Zoo and in Rajasthan and Ahmedabad Zoo in Gujarat have been breeding the Crocodilus palustris since 1967. Clearly captive breeding period can be divided into two: one from 1967 to 1975 prior to initiation of project and the second from 1975 onward.

Analysing the reasons for the failure of Indian zoos (there are over 40 zoos in India) during the first period, it is seen that in most zoos, Crocodiles were not primary exhibits. They were usually kept in pits on the ground - rather than in pools with enclosed basking areas and nesting grounds. The B.N.H.S journal has published accounts of such crocodiles laying infertile eggs in water. A further improvement to this was providing basking and nesting grounds but in most cases the stocks consisted of either only males or females, as how to find out sex of a Crocodile was not known

Many zoos even kept adult specimens of all the three species together - more to exhibit varieties. Naturally, this resulted in unsatisfactory husbandry and with the death of older ones new ones were replaced. However, by 1970 Gharial and S.W. crocodile had become 'so rare' that most of the zoos were unable to acquire new specimens. Only the widely distributed mugger was an exhibit in many zoos. The success of breeding mugger at Ahmedabad and Jaipur was 'more by chance than choice' and even to date only one pair of mugger have been breeding every year continuously from 1967. As no proper husbandry was available the survival figures have been very low. However, the situation is now improved a great deal.

In 1975, the first job of the project in this direction was to make an inventory of isolated adult crocodiles in captivity, for possible formation of breeding groups. This was followed by altering and redesigning existing

Crocodile exhibits to a more suitable breeding pool. Experimental new breeding pools simulating natural habitats were also designed at project Rearing centres. One of the first such project was designing of a Gharial breeding pool in Orissa with a dimension of $9m \times 45m \times 25m$ where a riverine habitat was created with circulating water and high rise sand banks. An adult gharial was brought from Frankfurt zoo in 1978 and was provided to three females obtained from Trivandrum (Kerala) and Nandan Kanau (Orissa). This group has ^{been} successfully breeding since 1981 and to this date is the only place in the world where Gharial are breeding in captivity. Over 75 resultant Gharial are now being reared at Nandan Kanau. Similar Gharial breeding pools have also been designed at Lucknow (U.P.), Bannerghatta (Bangalore) and Mysore Zoo.

With similar facilities, Mugger crocodile have bred at ²⁰⁰⁰ Delhi in 1976, Vizay, AP in 1978, Hyderabad in 1980. Separately at each state crocodile Rearing centres new breeding pools provided

has made the mugger to breed at Nandan
 Kanon 1982, Tikarbada 1982, Similital in 1983, and
 Amravati 1983 and Sathaur 1983 and Goe 1987.
 Captive breeding posts for mugger have been
 designed in Tadoba ^{ad Borivilli} (Maharashtra), Ranchi (Bihar)
 and Bangalore in Karnataka.

Table I shows the ten locations where
 captive breeding of ~~mugger~~ crocodiles has been
 a success.

In case of the S.W. Crocodile (*C. porosus*), however,
 the progress was slow. There were no adult sized
 specimens of both sexes with the zoos or with the
 projects and the wild population were too low to be
 drained further. Added to this, in the breeding
 enclosures designed territorial sub-adult females
 exhibited severe aggressiveness, making the project
 redesign new breeding enclosures. Now breeding
 posts for S.W. Crocodiles have been made at
 Dargamal orissa, Bhageshatpur (W.B), Nandan Kanon orissa
 and Vizey in A.P, and are expected to breed
 in about two years time. Two of these posts at
 WB and Orissa are in natural mangrove creeks.

The non-governmental WWF aided conservation organisation - Madras Crocodile Bank has been successful in breeding Muggers since 1975- and Saltwater crocodile in 1983 and has already been reported in an earlier paper in this seminar.

Results:

By captive breeding alone 1700 muggers ~~have~~ been ~~produced~~, 75 Gharial and 10 salt water crocodile have been produced. (TABLE II).

Studies made on Reproductive ~~Behaviour~~ Biology in captivity have thrown new lights on such aspects as territorial behaviour, Nest-guarding and parental care, first-breeding age and other related unknown facets of Crocodilian Biology. For example: Adult breeding male muggers have proved to be territorial during the breeding season and guards a favoured basking and mating territory and the female only a nesting territory. Similarly both sexes of saltwater crocodile have proved to be highly territorial from a sub-adult stage and prefer to be solitary.

The mugger has proved to be able to breed at an age of five years and unlike C. porosus is 'gregarious' by nature and is a suitable species for high density rearing and breeding.

Suggestions:

1. Now that the doubts of captive breeding success has been cleared, it is development of new captive breeding are suggested at least for the more endangered Gharial and saltwater crocodile.
2. By the 'grow and Release' technique adopted by state crocodile projects since 1975, most wild laid eggs are being collected every year. With the success of captive breeding and the assurance that stocks for 'grow and release' can be made available at anytime it is suggested that at least 5 part of the wild laid eggs be left in nature.
3. Since the husbandry of crocodile management right through to captive breeding has been extensively developed in practice and it is suggested that this knowhow be put to good effect in development of 'Crocodile Farming' in conformity with CITES and the project objectives since 1975.

1984

~~Barak~~

~~Barak~~

Zoo

Mi-

Br

Jr

D-

H-

V-

N-

B-

Goa

AKS

NR

TK

Remedy

Am

Instrum

2

9

15

Captive bred in 1984

Mughn - 15 locatn

S.W. wa - 2 locatn

Barical - 1 locatn

BREEDING OF CROCODILES IN CAPTIVITY

(YEAR OF BREEDING IN PARANTHESIS)

LOCATION	MUGGER	GHARIAL	S.W. CROC
JAHMEDABAD	X 1967	-	250
AJAI PUR	X 1967	-	200
MADRAS CROC BANK	X 1975	-	1000
MADRAS DELHI	X 1976	-	50
VIZAG	X 1978	-	40
HYDERABAD	X 1980	-	20
NANDAN KANAN	X 1982	X	10
TIKERPADA	X 1982	-	10
SIMILIPAL	X 1983	-	10
AMARAVATI	X 1983	-	10
SATHANUR	X 1983	-	10
GOA	X 1983	-	10
GOA	-	-	10

CROCODILE
STOCKS PRODUCED BY CAPTIVE
BREEDING

LOCATION	SPECIES	SURVIVING
JAIPUR ZOO	MUGGER	250+
AHMEDABAD	- do -	200+
CROCODILE BANK MADRAS	MUGGER	1000+
	S.W. CROC	10+
VIZAG	MUGGER	50+
HYDERABAD	- do -	45
DELHI	- do -	30+
NANDANKANAN	MUGGER	60+
	GHARIAL	75
TIKERPADA	MUGGER	70+
SIMILIPAL	MUGGER	?
SATHANUR	MUGGER	?
AMARAVATI	MUGGER	?
GOA	MUGGER	10+