

- 1. Geographical distribution
- 2. Natural history — ^{habitats} its way of life in habitat
- 3. Status present — detail } life cycle points out the aspect that are most vulnerable. are not etc. no conflict with man
- 4. Reasons for decline — (Int. trade) with man
 - a) Smuggling
 - b) Captive breeding
- 5. Conservation of Indian Case History — status
- 6. Restoration Research
- 7. Problems — conservation
- 8. Commercial farming — guidelines

Anterior part of
 (A)

- Status —
1. Orissa
 2. A.P.
 3. T.N.
 4. Gujarat
 5. Kerala
 6. U.P.

- At the moment
- Maharashtra
 - Karnataka
 - Assam/Chal Pradesh
 - Rajasthan
 - M.P.

10 Map of project sites + Sanctuaries

- Orissa — ^{Jatharajgarh}
- AP — Krishna
- TN —
- Ker. — 2
- Gujrat — 1 (Sir)
- U.P. — 2 (Cheetal + Indira) + Girga
- Chambal sector —
- Maharashtra —
- M.P. —
- Raj. — Ranthambore
- Karnataka —

(P.T.O)

Recommendation

- ~~1 Article in Yotam~~
- ~~2 State of Affairs~~
- ~~3 Rognon's Photograph~~

21/8/78

2. Natural History

Habitats preferred, way of life in habitat, life cycle - point out the objects

M. Conservation

1. Conservation Requirements -

2. How many we want -

3. How it should be distributed

Sanctuary
wild pop.

Captive
breeder
groups

forms

4. Safe guard measures - How

Basic guide lines

which are
I can do

Restoring

farming) state wide

$\frac{200 \times 20}{20000}$
 $\frac{20000}{40000}$

~~200~~
~~200~~
~~200~~

Tables for Bilamwata

1. Status

state or is

2. Rearing facilities

available

Proposed expansion site location

3. Sanitation existing

of Proposed

with restocking

Indicators to date.

4. Proposed captive breeding farms.

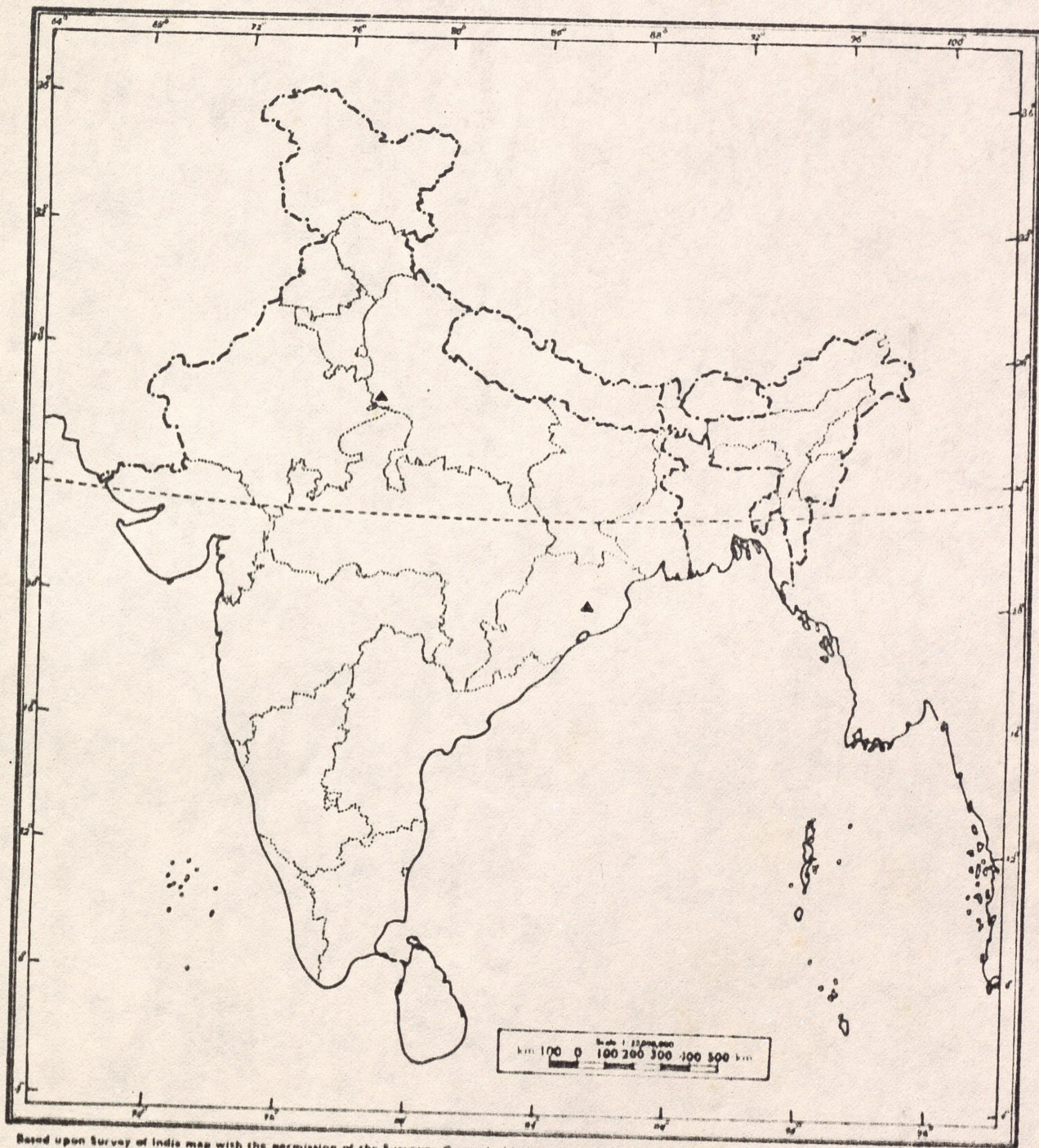
what requirements be done

Over

6. Captive Breeding Projects

1. Under the project -
2. Expansion and remodeling of existing breeding facilities in established zoos and other institutions.

20.



Based upon Survey of India map with the permission of the Surveyor General of India.

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

The boundary of Meghalaya shown on this map is as interpreted from the North Eastern Areas (Reorganisation) Act 1951, but has yet to be verified.

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9 CONSERVATION REQUIREMENTS

Prerequisite: (50%) TN, AP, Andhra, UP, Kerala, Orissa, Karnataka, Maharashtra

Mussur may be recommended for further subject to safeguarding.

1. Present status of mussur. → In the wild

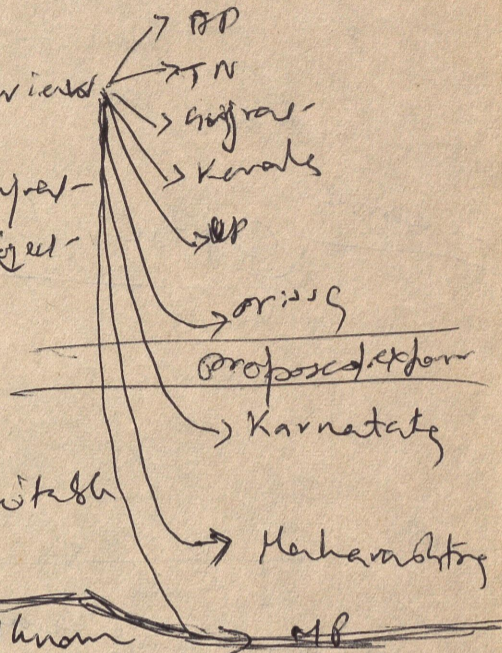
2. State mussur projects & reviewed

3. (a) under exploitation by TN, Andhra - due to non-observance of project

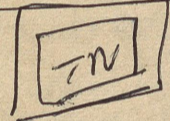
What requires to be done

fully exploit

build up the resource in suitable NP / sanctuaries



State wide basis



1. Status in the wild well known

new three sanctuaries free from commercial fishing

1. Sathanur	Initially 200	10 thereafter
2. Anaparthi - extd	50	10
3. Poyyur - Kederhake	200	20
4. Hojennakal with Karnataka	48	
Total release so far	178	$\frac{178 + 48}{1976}$
		1970

Recommended sites

Other recommended

3. Captive breeding projects - in farms, located

Locations

1. Sathanur
2. Suitable coastal side
3. Extreme south of TN

AP

wild

Status in the wild well known. 5 possible sanctuaries have been declared three for mussur & release taken place in 2 other we saw in the state. Agency has fulfilled the guideline.

Release in the three project sanctuaries

NSOM SKM, LM, Mangajira	Kisano	Pahala
300	100	
500		

thereafter - 30/yr | 3-5/yr | 5/yr |

Releas to date ① 8/97 fall

② 33 Kinnerasani

③ 15 Pakhal

Total — 56

Releas

Captive breeding

1. NJSR

2. Vizag

3. Hyd (existing)

Guipat Releas

1. Need to updating the status in the wild

2. Defining Mysor Management in Guipat NP

Two other sanctuaries should be set up and well managed

Releas (Numbers to be studied)

Other two sanctuaries to be advised when selected

Guipat

150

+ 10/yr new

Releas to date — none

At present — only 5 to 6% approximate 25/cluster collected each year.

Available Rearing Stations as proposed expansions with Grazing.

States	Existing Rearing Stations	Capacity A.R.S	Proposed expansions of	Capacity Recommendation
AD	Hyderabad	300	1. NTR 2. Vijay	

4. REASONS FOR DECLINE

The mugger crocodiles rapid decline almost to a stage of being 'Rare' ~~one~~ is due to several factors the most important ones being

a). Hide hunting

c). Egg robbing

b). Fishery Practices

e). Animosity and Muggers way of life

d). ~~Medicinal belief~~ crocodiles ^{parts} being used as medicines.

a. Hide hunting

Like most other endangered crocodilians of the world, the ^{mugger} ~~marsh~~ crocodile in India ~~was~~ also a victim of large scale hunting for their skins. The Indian mugger termed 'fairly common' in most of its distribution range during the 1930's to and 1950's was rapidly ~~depleting~~ ^{depleting} in number in the 1960's. ~~W.K. as legal~~ ^{protection} ~~needed~~ ^{market} for crocodile skins, no legal bar on killing crocodiles and rather easy access on getting mugger crocodiles in any sort of habitat. The crocodile hide hunters were most-organised. During the course of status survey of mugger crocodile ~~to~~ ⁱⁿ (IUCN) has collected ^{with} ~~with~~ ^{samples} information of organised slaughtering of crocodiles in 1960's in the southern state of Tamil Nadu, Andhra Pradesh and Karnataka. Its last as ~~1972~~ ¹⁹⁷⁰⁻⁷² in one reservoir of Andhra Pradesh ^{alone} ~~and~~ ^{above} ~~25000~~ ²⁵⁰⁰⁰ ~~adult~~ ^{adult} ~~size~~ ^{size} muggers were killed when the reservoir dried up because of severe drought. The professional hide

hunters acting as middle men purchased the skins at very nominal prices. In Andhra Pradesh ~~crocodile~~ ^{hide} professional hunters or their agents from Karnataka, Tamil Nadu & Maharashtra operated in Godavari and Krishna river. The last to learn ~~about~~ ^{and operate} this lucrative business was the Coastal business centres at Vijayawada and Rajamahendravaram of A.P. This only serves as an example of how killing continued elsewhere in the species distribution range.

b. Fishing Practices.

Construction of barrages and dams across the rivers, unlike the gharial, proved beneficial for mugger crocodile. These altered habitat and large expanse of water served mugger as a source of perennial water ~~and~~ ^{and} in most of such reservoirs the mugger population ~~gradually~~ ^{and} have shown an ~~steadily~~ ^{increase} in the population, but for the fishing practices both official and private.

Such reservoirs were mostly under the control of P.W.D. Dept or fishing Dept being utilized for monospecies ~~fish~~ fish culture, with out any proper knowledge about the feeding behaviour/preference of mugger crocodile, the fishing Dept. declared the crocodiles

presence detrimental to fishing and ⁽²⁾
encouraged crocodile killing. This official patronage
combined with non-official killing by small fishermen
~~operating with nylon nets to avoid loss of~~ ^{trying to spearhead their} ~~only~~
nets being destroyed by myssus. Actually the set
nets ^{across the river} practice never gave a chance to myssus
crocodile to avoid the nets. So the killing
continued. Perhaps next to hide hunting this
self legalised killing of myssus have been responsible
to bring myssus in to the 'Rare' list sooner
than it could have ^{come} otherwise.

C. Egg Robbing

Added to the natural predators
of myssus eggs like ~~mongoose, monitors, wildboars~~
Jackals, in recent years ~~there has been another~~
~~predator - the humans, what is left by the natural~~
~~predator goes to the humans,~~ ^{egg robbing of crocodile}
has become another major reason of decline in the
myssus population growth. Egg robbing has been reported by
Whitaker (1974) and has been seen by SCC during his
researches in AD. In both the cases the eggs are robbed
with the ^{belief} of medicinal qualities of crocodile eggs, supposed to
be a cure for rheumatic pains and bronchitis.

d) Crocodile parts being used as medicines

Though crocodile meat is not usually eaten by ^{most} people as a delicacy, with the recommendation of a Hakim (medicine man) in many parts of India people do eat crocodile meat. Some ~~tribes~~ living along the banks of rivers of India are known to eat crocodile meat. In ~~the~~ ^{the} ~~river~~ ^{the river} Ganges particularly near Benares (Pers. Varanasi), in ~~the~~ ^{the} ~~districts~~ ^{districts} of Shambhar, Bhopalkhandwa, etc, in Godavari in Maharashtra & AP in Krishna in Karnataka & AP, in Conary in TN there are many instances of people eating crocodile meat with a medicinal belief.

Particularly prized are the Gall bladder, Bile Liver and kidney which are believed to be cures for diseases like Bronchitis, Asthma, whooping cough, ulcers and even eye disease like cataract.

It is not common to see old men sitting these road side Hakims selling bottles of medicine claiming the contents as crocodile fat (in some cases mixture of ~~the~~ different reptiles fat including monitor, Python) assuring believers a ~~100~~ percent cure of Arthritic knee joint pains etc.

Crocodile teeth, dorsal scutes etc are used as charms in many parts of India ~~as~~ ~~do~~ crocodile skulls are kept in houses to drive off the evil spirits.

2. Animosity.

This ~~is~~ factor, of which perhaps come first, and do have affects the decline in myzom population. In most of its distribution range the myzom crocodile has been thought / believed to be a harmless creature. The reason may lie in its small size compared to the maniveness of the ~~the~~ estuarine crocodile; and the eternal fear that has been passed to us as a man-eater.

Whenever animosity killing has happened at Myzom works are due to its wandering nature.

During the dry months the myzom crocodile walks long distances and finds refuge in the village ponds and occasionally some domestic stock as food. This brings in some animosity and daily wandering myzom are killed.

At last however with increasing water use in rivers in the form of life irrigation etc cultivable lands have come right up to the river banks. and This has made people use the fields as grazing ground when not in use, leaving the myzom to take a few domestic stock. This brings a bad name to the myzom.

~~Conservation~~

~~PROGRAMS~~

F. CONSERVATION OF ~~RESTRICTING~~

9) REARING STATIONS & RELEASES FOR RESTRICTING
Licensure to provide protection to the Mugger crocodile
first came in India in 1968 when export of skins of
all crocodile were banned. This action decreased the

Commercial hunting of muggers, in ~~at~~ but, the fisheries depts
operating in Reservoirs continued to authorise killing of
crocodiles in these waters, blaming the reptiles of causing
damage to fish and fishing gear. ~~total~~ ~~protect~~ ~~level~~ ~~total~~ ~~protect~~ ~~protection~~

wildlife (protection) Act - which declared the ~~mugger~~ ^{species}
~~crocodile~~ to be an endangered species. States ~~were~~ ^{were}
slow to adopt this Act - but this Act paved the way
for protection of muggers.

Till the FAO (1974) ~~report was published~~ ^{was published} no
reel conservation programme ~~has~~ ^{has} started, except for a
few zoos like Ahmedabad, Jaipur, Bangalore, Madras
Crocodile Park Trust - breeding or trying to breed the muggers
in captivity.

After the ~~1974~~ FAO (1979) report, the pilot project
Indian crocodile conservation project was started in Orissa in
1975 with the objectives of providing conservation facilities
to all the three Indian crocodilians. However, the critical
position of Gharial ^{in its distribution range} followed by the saltwater crocodile
in the Indian mainland directed the project's attention to
both these species. Other states followed ~~after~~ ⁱⁿ providing

Conservation facilities to muggers, some jointly with
other Indian crocodile species and some ^{solely} ~~individually~~
for muggers. This is presented below state wise in
case history of mugger conservation. The ^{entire} ~~entire~~ ^{of these} ~~of these~~
of the ^{project} ~~project~~ ^{concentration} ~~concentration~~ ^{of all its efforts to save the} ~~of all its efforts to save the~~
endangered ^{gharial and S.W. crocodile, shadowing the need} ~~endangered~~ ^{to save the of these species.} ~~to save the of these species.~~
Indian Case History (state wise)

1. ORISSA :

With the initiation of crocodile conservation project
Orissa state intended to start three sub projects at
Tikerpada for Gharial, Daryamal for saltwater crocodile and
Similipal for muggers. (Fig 1) But, with concentrated efforts ^{to} ~~to~~
the former two species the mugger project never came
off the ground. However, fifteen mugger hatchlings
hatched in 1975 from eggs collected in Tamil Nadu
were brought to the Tikerpada ^{gharial} ~~gharial~~ ^{conservation} ~~conservation
and Research centre and are being reared there. By
1988 several of these have attained the ^{breeding} ~~reproductive~~
age and are now being tried for captive breeding
programme of the state project at Nandanam Biological
Park. At the time of writing this it is also ^{known (for} ~~reported (R.C.)~~
that the Similipal Mugger project is already
off the ground with twenty four two year old muggers
being reared from ^{T.N. stocks} ~~to the wild~~ and are due for
release ^{by the end of 1979} ~~to the wild~~ ^(Per Govt Secretary) ~~to the wild~~
in the Similipal Tiger Reserve National Park.
A state survey for ^{mugger} ~~mugger~~ ^{breeding} ~~breeding~~ ^{is} ~~is~~
being planned and a reservoir ^{with} ~~with~~ ^{within} ~~within~~
reserved forest area is being planned to be declared a~~

sanctuary for the mugger.

TAMIL NADU: No other Indian state has achieved the success what TN has in ^{wildlife conservation}. ~~the history of Mysore~~ conservation in this southern state of Tamil Nadu started in the early seventies. Till 1988 the ^{state} fisheries department used to sell the ^{crocodile killing} rights to fisheries contractors in the reservoirs arguing the presence of crocodiles as detrimental to fisheries and fishery practices. After the export of crocodile skin ban ~~and in~~ and stopping of the ^{unauthorized} crocodile killing in the reservoirs the killing continued unabated till the 1972 wildlife act came in to force in TN in 1975. But - in most cases the killing was more out of general animosity than of profitable motive, because the skins in most of the cases were either sold at a very nominal price or just allowed to go waste.

In 1973 The Madras Snake Park Trust a WWF India aided project approached the TNFD for collection of wild life crocodile eggs for hatching ^{and display} purposes at the park's exhibit grounds. The MSPT was allowed to do this on the condition that ^{the resultant} 25% of the collected eggs are to be returned to the forest dept.

for eventual release in to the wild. The MSPT were also asked to submit a quarterly report of their stock position to the Government.

The first collection of wild laid eggs and wild hatchlings was carried out by the MSPT in 1974, which resulted in ~~xxx~~ ^{xxxx} hatchlings. In ~~1975~~ In 1975 the ~~MSPT~~ ^{MSPT} collected ~~xxx~~ ^{xxxx} eggs / hatchlings from ~~xxxx~~ ^{xxxx} centres (Calicut 1977).

In 1976, the state forest Department of Tamil Nadu, ~~the~~ ^{the} ~~crisis~~ ^{crisis} participants in the collection of wild laid eggs for hatching purposes. By then the crisis state Coarable Project was already underway with the Govt. India & UNDP assistance and the TNPD project was in preparation. The condition of this joint programme was that 50% sharing of the resultant hatchlings by both the states. Since no hatchery / hatching / rearing infrastructure was available with the TNPD, the whole operation was carried out ~~at~~ ^{at} ~~the~~ ^{at} MSPT as the base station for initial hatchery / hatching / rearing complex. The ~~and~~ ^{and} first author was one of the participants in this year's efforts. The 1976 coordinated, ~~coordinated~~ ^{coordinated} effort resulted in maximum number of egg (586) (xxx) (Whitaker, 1975) collection and hatching till then, but due to

It should however be noted with concern that both the release site are not protected sanctuaries and are not protected sanctuaries in any way. The fate of survivors of the released crocodiles are in jeopardy.

procedural difficulties the resultant hatchlings have never shared by the states. Hand pressed with housing facilities etc the hatchling mortality was high. But by the end of 1976 and beginning of 1977 the TNFD has started their own state crocodile project and took over the 1977 results stock of muggers from MSOP.

Tamil Nadu state project started their project with four rearing stations one each at Sathenur, Hojenaher, Amravati and Madras. By 1977, started collection/hatching of wild laid eggs with fair amount of success. The eggs from three stations depended on eggs collected from the ~~same place~~ adjoining habitat but - the Madras complex had to bring eggs from the Cauvery delta area, i.e. from Chidambaram, Killikulund, Brisangur and Coleroon river. (See Com. V.M. Navasinkam)

In 1978 the four stations together collected XXX eggs and hatched XXX and in 1979 the state provided egg collection facilities to the (CBMT) trainers at two of their centres.

~~In 1979~~ The first large scale release of muggers in India was carried out by this state at Krishnagiri Reservoir (Fig) when 130, muggers of 1977 hatched muggers were released on 9 March 1978. This was followed by another release of 40 muggers in to Cauvery river in May/June 1981.

Andhra Pradesh.

The AP project started in late 1976 with a general survey of the state to assess the mussel crocodile habitats. (In this state are present only mussel crocodiles, the Gharial is extinct and ~~the~~ unconfirmed report of Gharial in the Godavari River have been collected). The survey showed a very gloomy situation indicating the ^{scattered} breeding population to be not more than six pairs in the Krishna, Godavari and other river systems. (1977 AP PD publication and survey reports unpublished). The state had ~~plans~~ ^{plans} constructed ^a central rearing station at Hyderabad where all eggs collected from the state were intended to be hatched and reared with plans to extend similar facility gradually to three other field stations at - Rajamahendravaram, Rajamahendravaram and Rajamahendravaram.

In 1977 the state was able to collect only one clutch of eggs from AP which proved infertile and had to depend on eggs from other states. Six nests ^{145 eggs} were collected from ^{the} sanctuary of Godavari and brought to Hyderabad for hatching - result is 103 hatchlings with excellent husbandry conditions the survival was 100% at the end of 1st year. In

In 1978 the egg collection improved to three nests from the state 2 from Krishna river and one from Godavari but - all proved infertile. One nest - however hatched in the wild in the Marjuna river (F.S.)

and hatchlings were caught and brought back to
the complex at Hyderabad. With states with road
muggers to heretofore like Gujarat TN states their
own project getting muggers egg became difficult.

In 1978, again three nests were collected
from Godavari, but the previous years nesting site
in Krishna River ~~had some underwater~~ had
submerged in the irrigation reservoir water spread.
However for the first time in 1979 Andhra Pradesh
egg hatched in the hatchery. Out of
three nest one ^(31 gm) proved infertile and from
two other a total of 10 hatchling resulted.

This state however first initiated the pilot
release programme of captive raised ^{muggers} ~~flow~~ ^(one week from) ~~carp~~ ^{first}
crocodile, anywhere in Andhra in Feb 1977.
reared juvenile muggers crocodiles from the Nehru
Zoological Park ^{under its endangered species conservation programme} ~~at~~
St. Peter's falls. By Dec 1978 the muggers ^{were} released in
this area and regular monitoring since 1977 till
shows has shown ^{all the} ~~the~~ ^{with} ~~with~~ ^{releas} ~~releas~~ ^{muggers} to have
been there showing excellent growth and furthering
public interest in the project since the release
place is also one of the major tourist-
attraction centre.

Andrew Braden also declared three sanctuaries for mugger crocodiles one each at Nagarjuna Nagar - Orissalam in the Krishna River, Rang modra in Satevare River and Mangire river 6 km away from Hyderabad (T.S). Other than this three places there are other declared sanctuaries like Mahabulnagar Kinnerani where muggers have been rehabilitated in a major way. In ~~the area where they are freely~~ ^{sanctuaries where} reintroducing programmes are taking place.

Gujarat:

Next to Tamil Nadu perhaps the best - largest population of mugger can be seen in Gujarat. Only in the Gir Lion Sanctuary in four lakes the mugger populations are excellent. In 1977

Joseph et al and Whitaker ... reports say number of muggers in the Hiray Lake. In 1977, the first author observed 21 nests in Hiray Lake alone of which 8 were collected for A.P. project. The other nests were collected by the Gujarat - State crocodile project - ^{start in 1977} ~~and~~ stationed at Gir. From 1977 onwards the Gir crocodile station is collecting wild laid eggs for hatching

and nesting. In 1977 the collection
of ^{xxx and} resulted in xxx hatchlings and in 1978
xxx x eggs resulted in xxx hatchlings.

This project is also providing other
neighboring states with many hatchlings and
states like Maharashtra have already taken
hatchlings from Gujarat.

Kerala

V.P

The V.P project is primarily concerned with
Gharial. In four years since 1876 the V.P project
has produced more than 2000 Gharials. But the
V.P project also has been collecting muggle eggs
a smaller way along with Gharial eggs.

~~7~~ RESEARCH

8. CONSERVATION PROBLEMS

Projects

Charms

S.W. Croc

Myssor

1. Kerala			X
2. Tamil Nadu			X
3. Karnataka			
4. Andhra Pradesh	X	X	X
5. Maharashtra			X
6. Gujarat			X
7. Madhya Pradesh	X		
8. Orissa	X	X	X
9. Rajasthan	X		
10. UP	X		X
11. Bihar			
12. W.B		X	
✓ 13. Punjab			
14. Haryana			
15. Himachal Pradesh			
✓ 16. J & K			
17. Arunachal Pradesh			
18. Assam			
19. Meghalaya			
20. Tripura			
21. Mizoram			
22. Manipur			
23. Nagaland			
24. Sikkim			
UT/S		X	
AN			
2 & Ministry			
Gov			
Outidney			



OFFICE MEMORANDUM

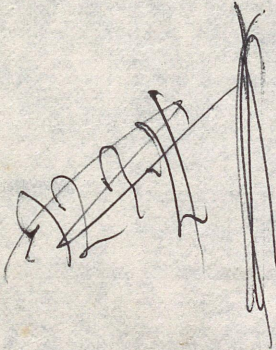
TO: Mr. B. C. Choudhury

DATE: 3.12.1980

FROM: Dr. H. R. Bustard

SUBJECT: Mugger conservation in India.

The above topic will be discussed shortly a specially convened meeting of the Government of India in New Delhi. Please come to see me early next week prepared to discuss the mugger conservation requirements in the country as you see them, in some detail.

 This has presumably been set out in the Biological Conservation manuscript which we are writing. What is the status of this manuscript? I would like to be able to table the manuscript at the meeting which means that it should be definitely ready and finalised within December.

9. PRESENT STATUS OF MUGGER IN INDIA.

It was in the late sixties, the mugger crocodile was considered to ^{be} becoming a rare species in its distribution range. Gee(1969), Guggisberg(1969), Seshadri(1969), Mishra(1969), Daniel(1970), Biswas(1970) and Honnager(1971,1973) all drew attention to the serious level of depletion of the mugger crocodile in various parts of the country. Bustard in 1974 carried out a rather extensive survey of the country to assess the Indian Crocodilian situation and reported that the species is greatly depleted in numbers and has to be considered 'rare' in most, ~~of its~~ if not all of its former distribution range. Bustard noted,

" In south India (Tamil Nadu, Karnataka, Andhra Pradesh), populations though hardhit could show a rapid response to management combined with effective protection. This is probably also the case in Rajasthan and Gujrat".

Mukharjee(1975) commented on the present surviving muggers in Rajasthan and Gujrat as the ones that survived because of religious feelings of people. In spite of several factors operating against the survival prospect of Muggers, this species continued to survive because of its adaptability which Bustard summarised ~~in~~ in his 1974 report. He commented on the adaptability of the mugger to village ponds and irrigation tanks in addition to rivers, swamps and lakes ~~in addition to rivers~~ and noted that the extensive dam construction work taken up in recent decades in India, which had destroyed much former excellent gharial habitat, had created habitat suitable for mugger were it not for the adverse effect of the fisheries management (setting of nylon gill nets).

Since then(1974) the status of mugger is now fairly well known, at least in states that are operating FAO/CGI aided crocodile projects. The states for which good status records are available are Andhra Pradesh, Tamil Nadu, Orissa, Uttar Pradesh, Gujrat and to a limited extent for Maharashtra and Kerala. There are however several states in the country where muggers are known

known to occur but no status report are available. There is a urgent need to update the status of mugger in the country.

Mugger crocodile were once abundant in all over South India and to date they are still to be found in good numbers. In north India, though mugger occurs in the gharial habitats the numbers were very small (Ref Pitman, Col Singh).

South India.

In south India muggers were common in the east flowing rivers like Cauvery, Krishna and Godavari and their tributaries. But, the massive hunting phase of the fifties brought their numbers down. At present good population of mugger exists (from which they can be recovered subject to good protection and management) only in Tamil Nadu. (Whitaker, 1974; Bustard 1974, Choudhury 1970). In Andhra Pradesh the breeding population in the whole state could not be more than thirty (Choudhury in prep). No data are available for Karnataka except what is given by Bustard in his 1974 report. Krishnan() however reports to have seen very large sized muggers in this state. In Kerala they appear to be scattered populations in north and south Kerala but details are lacking.

West India.

In the west, Gujrat holds the best population of mugger in the Gir National Park and other lakes near Baroda. (Oza 197 and Chavan 197 Whitaker 197 Joseph 197) (Dharan Kumar Singhji). No reports are available for Rajasthan except statements by the wildlife officials in which they report large mugger populations in the state. The BIMS has carried out some surveys for Maharashtra in limited areas but populations are known to occur in Tadoba National Park.

North India.

In north India mugger populations occur in states of U.P and Bihar. In U.P, Corbett national park and Dudhwa national park holds small populations (Ref Tiger Haven), but in U.P muggers must be considered 'rare'. The state crocodile project while carrying out survey for gharials collected reports of muggers in Ghaghara river (Bihar st.), Ganga (Uttaranchal st.) and scattered popl in small reservoir (Uttaranchal st.). It has pointed out the critical position

of mugger in Bihar in 1970. Since then the situation has gone worse. Shahi in his analysis of Bihar's wildlife in his now famous book Backs to the Wall gives some account of muggers in Bihar.

Eastern India.

In eastern India muggers appears to have been lost since Orissa reports muggers to be extremely 'rare' in the state. In West Bengal muggers are considered to be extinct. In some parts of Assam and Arunachal Pradesh muggers are reported but their status should be considered as 'unknown' till detail surveys are carried out. Smith(1939) gives muggers easternmost range in India to be Darang dt. of Assam which may not be correct.

Central India.

No records are available for Madhya Pradesh though M.P. was the place from where many muggers have been reported by wildlife writers in India during the thirtys and forties. Most reports in the BWS journals about muggers are from this central province. It is beleived that M.P. may still be holding good populationd of Muggers but till further surveys are carried out it should be considered as 'unknown'.

CONSERVATION STATUS OF INDIAN MUGGER CROCODILE (Crocodylus palustris Lesson,) IN INDIA.

Great concern was expressed by Crocodile Conservationists, both in India and abroad on the rapid decline of the Mugger Crocodile in India, (Gee (1964), Mishra (1970), Daniel (1970), Biswas (1970), Bustard (1969, 1971), Seshadri (1969) and Honneger (1971)). Government of India provided total legal protection to this species by enlisting it in scheduled I of the Indian Wildlife (Protection) Act of 1972. In the FAO (1974) report the status of this species in India was defined rather vividly. Being very widely distributed in the Indian sub-continent it can be considered as the truly Indian Crocodile. This has happened because of the species's great adaptability to ^{different} any kind of fresh water habitat including village tanks.

By 1974, when the Govt. of India Crocodile Project with FAO/UNDP assistance was initiated, all out efforts to save the critically endangered gharial (Gavialis gangeticus) and the estuarine crocodile (Crocodylus porosus) overshadowed the true Indian Crocodile - the Mugger.

CONSERVATION PROGRAMMES:

Initial conservation efforts from 1974 onwards for this species was confined to Madras, where the WWF - India aided Madras Snake Park Trust was trying to collect wild laid mugger eggs in Tamilnadu for artificial hatching and rearing. In 1975, the Orissa State Crocodile Project brought this species into the folds of their crocodile rearing programme and started rearing muggers in their pilot rearing centre at Tikerpada along the banks of river Mahanadi in the Sat-kosia Sat-kosia Gorge Sanctuary.

From this small beginning in 1975, by 1980 other Indian States had joined in providing conservation measures to this species by collection of wild laid eggs for artificial hatching and rearing and the species was rapidly increasing in number

and

on its way to be considered as a renewable wildlife resource.

The states that are now providing conservation facilities to this species includes states such as Tamilnadu, Kerala, Andhra Pradesh, Orissa, Gujrat, and Uttar Pradesh with Government of India's assistance, ^{state like} and Maharashtra, Madhya Pradesh and Karnataka ^{state schemes} are operating on their own. A list of mugger rearing stations in various states and their present stock ~~is~~ given ~~in~~ Table-I. ~~XXXXXXXXXXXX~~

RE STOCKING IN THE WILD

Under the Indian Crocodile Projects captive reared crocodiles are being released back into the wild to restock the suitable crocodile habitat for mugger crocodiles. This operation started in the year 1977 in Andhra Pradesh since then several states have followed suit. This is presented in Table-II.

However, as selected ~~the~~ restocking sites are not always protected habitats/sanctuaries, restocking programmes have faced ^{difficulties on account of possible} ~~a set back~~ looking at the potential conflict from public. As such restocking sites are being choosen judiciously.

~~so as not to antagonise public sentiments.~~

CAPTIVE BREEDING

Indian Mugger Crocodile has been bred in ~~the~~ Indian Zoos since 1960, (Honniger, 1971). But, these were not aimed at specific conservation programmes. After the initiation of the conservation programme several ~~xxxx~~ Zoos and institutions have planned and achieved success in breeding the mugger crocodile. This has been enlisted in Table-III.

SANCTUARIES

Some crocodile ^{project} ~~project~~ states have declared new sanctuaries for this species while other states have gone ahead to restock this species in the existing sanctuaries

with ^{suitable} good crocodile habitats. Sanctuaries declared for the species are not meant only for mugger, but for all wildlife. In Table-IV a list of Sanctuaries in India have been given where muggers are existing at present or are being restocked.

FUTURE

With the future of gharial now being considered safe in India with successful rearing projects in U.P. Orissa, and Rajasthan combined with the success in captive breeding of gharial in Orissa, the North Indian States are now keen to extend the conservation programme to the Indian Mugger crocodile which still now has had conservation support mostly in the South.

The immediate future programme for the species every where in India is ensuring its safety in its natural habitat of both the remaining wild population and the restocked population.

Simultaneously with newer approach to rearing facilities several Indian States ^{are interested} might try to find out if this Indian Crocodile can be used as a renewable wildlife resource following the economic proposition by FAO in their 1975 and 1978 report prepared by B de ward.

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TABLE I

LIST OF MUGGER REARING STATIONS IN INDIA AND THEIR STOCK

STATES	REARING CENTRES	YEAR OF INITIATION	PRESENT STOCK (Approximate)	REMARKS
<u>Govt. of India Aided Projects.</u>				
1. Orissa	1. Tikerhada	1975	15	} Stock brought from Tamil Nadu.
	2. Similipal	1979	25	
2. Tamil Nadu	1. Madras	1976	50	} Part of 1976, 1977 and 1978 stock has been released back to the wild.
	2. Amaravati	1977	200	
	3. Sathanur	1977	400	
	4. Hogganahal	1977	100	
	5. Coimbatore	1976	25	
3. Andhra Pradesh	1. Hyderabad	1977	200	Part of 1977 stock released back to wild.
4. Gujarat	1. Gir	1977	400	Part of 1977, 1978 stock have been sent to other state projects.
5. Kerala	1. Neyyar	1976	} 50 to 100	
	2. Peruvannamuzhi	1978		
6. Uttar Pradesh	1. Kukrail	1975	100	
<u>State Projects</u>				
1. Maharashtra	1. Tarasa	1978	50	
2. Karnataka	1. Bannerghatta	1977	50	
<u>Private Project</u>				
† Tamil Nadu	1. Madras Snake Park & Crocodile Bank Trust WWF-aided	1974	300	Part of 1974, 1975, 1976 stock sent to other state projects.

TABLE II

MUGGER RESTOCKING IN INDIA - Their location and number of crocodiles released.

Sl STATES	YEAR OF RELEASE	RESTOCKING AREA	Number Released
1. Andhra Pradesh	1. 1977 & 79	Ethipothala falls (Krishna river)	6
2	2. 1980	Kinnerasani Sanctuary	33
3. Tamil Nadu	1. 1979	Krishnagiri reservoir	130
4	2. 1980	Cauvery river	48
5. Madhya Pradesh	1. 1979	Sirpur National park	25

TABLE III

Institutions breeding Muggers in Captivity

Institutions	Year of Breeding	Information source
1 Ahmedabad Zoo	1960 (?) onwards	David Reuben (1969)
2 Baroda Zoo	1960 (?)	International Zoo Yearbook Vol 9
3 Jaipur Zoo	1962 onwards	Mahendra Prakash (1973)
4 Madras Snake Park & Crocodile Bank	1974 onwards	Whitaker - R. (Pers Comm)
5 Delhi Zoo	1976 onwards	Peter M.B. 65 (Pers Comm)
6 Vizag Zoo	1977 onwards	
7 Hyderabad Zoo	1980	

Institutions Attempting Captive Breeding

1. Nandan Kanan Biological Park (Orissa)
2. Bannerghatta (Karnataka)
3. Kukruvi (Viz. Pradesh)

TABLE IV

WILDLIFE SANCTUARIES FOR MUGGER RESTOCKING

STATE	SANCTUARY	REMARKS
Andhra Pradesh	1. Manjira Wildlife Sanctuary	wild popln existing
	2. Langamudga W.L. Sanctuary	- do -
	3. Nagarjuna Sagar - Srisailem W.L. Sanctuary	wild popln existing and future restocking area
	4. Kinnarasa W.L. Sanctuary	Restocked
	5. Pakhal W.L. Sanctuary	Popl. existing and proposed restocking area
Gujarat	1. Gir W.L. Sanctuary	Wild Popl. existing
Tamil Nadu	1. Annamalai W.L. Sanctuary	wild popl. existing
	2. Moyar - Kaddahalle	proposed sanctuary
Orissa	1. Similipal National Park	} To be restocked
	2. Hadgarh	
Kerala	1. Neyyar W.L. Sanctuary	} wild popln existing proposed and T. be restocked
	2. Perambikulam W.L. Sanctuary	
Uttar Pradesh	1. Corbett National Park	} wild popln exists - do -
	2. Dudwa National Park	
Maharashtra	1. Tadoba National Park	wild popln existing

over. The table I show gives state wise details of ^{mugger} conservation activities.

Table 2 - List of Mugger Rearing Stations ~~in their state~~ in India & their stock

States	Rearing Centers	Year of initiation	Present Stock (Approx)	Remarks
G.O.P. Coimbatore District Kerala	1. Tikerpade	1975	15	Brought from TN
	2. Similipal	1979	25	
2. Tamil Nadu	1. Madras	1976	50	Eggs collected for stock & hatched 1976 & 1977. Stock already released in the wild.
	2. Amaranat	1977	200	
	3. Sathanur	1977	400	
	4. Hosjenahal	1972	100	
	5. Coimbatore	1976	25	
3. Andhra Pradesh	1. Hyderabad	1977	200	Eggs collected for stock 1977. Stock released back to wild.
4. Gujarat	1. Gir	1977	400	Eggs collected for wild. 1977, 1978. Stock have been sent to other states.
5. Kerala	1. Neyyar (Trivendrum)	1976	500	Import from other state
	2. Peruvemba muzhi (Calicut)	1977		
6. U.P.	1. Kukrail	1975	100	Eggs collected for state. Muggers being reared experimentally.
<u>States own attempt -</u>				
7. Maharashtra	1. Taroba	1978	50	Import of eggs collected
8. Karnataka	1. Bannerghatta	1977	50	Collected for state.

Rehabilitation Release Restocking in the wild.

Captive reared musk deer are being released back in to the wild to restore the suitable habitats. These started in 1977 in Andhra Pradesh and since then, this is in progress as given in Table II

Table II - ~~Musk Deer~~ Restocking Programmes in India

State	Release Year	Release Place	Animals released
1. A.P.	1977/78	Etipothale Falls (Krishna river)	6
	1980	Kinnaravani reservoir Tributary Godavari river	33
2. Tamil Nadu	1979	Krishnagiri reservoir Pannaiyar river -	130
	1980	Chuvay river	48
3. M.P.	1979	Simpur lake	25

As ~~per~~ selected release sites are not always protected habitats / refuges restocking programmes becomes a matter of great concern hence find a self-back looking at the potential ~~benefit~~ from the public.

Captive Breeding

Indian mugga crocodile has been bred in the Indian zoos since 1960 (Honeyman 1971) but these were not aimed at specific conservation programmes. After the announcement programme several other zoos & institutions have been successful in breeding Mugga.

They are ^{listed} below. ^{India} ^{breeding} ^{Mugga} ⁱⁿ ^{captive}

<u>Zoo/Institutions</u>	<u>Year of Breeding</u>	<u>Remarks/Information</u>
1. Ahmedabad	1960 (?)	(David Reuben 124B)
2. Baroda	1960 (?)	
3. Jaipur	1962 onwards	(Prakash Meher ^{INDIA 197})
4. Kaffras Crocodile Bank/Saake Park	1974 onwards	(Whitaker R. Hampden)
5. Delhi	1976 onwards	(SRS, Common)
6. Vizag	1972 onwards	(do)
7. Hyderabad	1980 onwards	(do)

Attempts being made with wellplanned breeding pools.

R.

1. Nandan Kanan (Orissa).

2. Bannarghat (Karnataka)

3. Karkra (UP)

Sanctuaries

Some Crocodile Project states have declared sanctuaries for the species while other states have decided to restock the species in the existing sanctuaries with crocodile habitat. It is true that Sanctuaries declared for the species are not meant only for mugger, but for all wildlife. as ~~shown~~ ^{existing or breeding} listed below are sanctuaries where mugger are ~~present~~ either being restocked or have to be restocked.

<u>State</u>	<u>Table II - List of Sanctuaries for Muger Restocking</u>	<u>Sanctuary</u>	<u>Remarks</u>
Andhra Pradesh	1.	Mangrove Wildlife Sanctuary	population existing and to be restocked with additional stock
	2.	Kangra mangrove W.L. Sanctuary	Popln. existing
	3.	Nagarjuna Sagar - Drisailam W.L. Sanctuary	Popln. existing and future restocking area
	4.	Kinnarajani W.L. Sanctuary	Restocked
	5.	Pakhal W.L. Sanctuary	Popln. Existing + to be restocked.
Gujarat	1.	Gir W.L. Sanctuary	popln. existing
Tamil Nadu	1.	Annamalai W.L. Sanctuary	Popln. existing
	2.	Moyar - Kedarahalle	proposed sanctuary

Future

Oriya

1. Similipal Tiger Reserve

To be restocked

2. Hadgarh

To be restocked.

Kerala

1. Neyyar River Sanctuary

To be restocked

2. Perambikulam W.L. Sanctuary

To be restocked

Maharashtra

1. Taroba N.P.

to be restocked

Future

With the future of Ghazal now being considered safe with successful ^{rearing} projects in Orissa, UP and Rajasthan and success in captive breeding of Ghazal in Orissa, the north Indian states are also keen to extend the conservation programme to the Indian muffs which till now has had conservation programmes only in the South.

The immediate future programme for this species everywhere in India is ^{ensuring its safety} ~~ensuring its safety~~ ~~finding it safe~~ in its natural habitat - both the remaining wild herds and restocked herds.

Simultaneously, with newer approaches to rearing facilities being surveyed Indian states might try to find out if this Indian muntjac can be used as a renewable wildlife resource following the economic prohibition by FAO in their 1975 & 1978 reports - prepared by ~~de Ward~~ Ward.

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Very good MS

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HEB eding

CONSERVATION STATUS OF INDIAN MUGGER CROCODILE (Crocodylus palustris Lesson,) IN INDIA

Bee

INTRODUCTION

Great concern was expressed by Crocodile Conservationists both in India and abroad on the rapid decline of the Mugger Crocodile in India. ^(C-R) ~~See~~ Gee (1964), Mishra (1970), Daniel (1970), Biswas (1970), Seshadri (1969) Bustard (1969 and 1971) and Honnegger (1971). Government of India provided total legal protection to this species by enlisting it in schedule I of the Indian Wildlife (Protection) Act of 1972. In the FAO (1974) report the status of this species in India was defined rather vividly. Being very widely distributed in the Indian sub-continent it can be considered as the truly Indian Crocodile. This has happened ^{Due to} because of the species's great adaptability to different kinds of fresh water habitat including village tanks. ^{very common regions this}

① 2!
② what does this mean - should

By 1974, when the Government of India Crocodile Project with FAO/UNDP assistance was initiated, all out efforts to save the critically endangered gharial (Gavialis gangeticus) and the estuarine crocodile (Crocodylus porosus) overshadowed the true Indian Crocodile - the Mugger.

CONSERVATION PROGRAMMES

Initial conservation efforts from 1974 onwards for this species was confined to Madras, where the WWF - India aided Madras Snake Park Trust was trying to collect wild

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Address

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laid mugger eggs in Tamilnadu for artificial hatching and rearing. In 1975, the Orissa State Crocodile Project brought this species into the folds of their Crocodile Rearing Programme and started rearing muggers in their pilot rearing centre at Tikarpada along the banks of river Mahanadi in the Satkosia Gorge Sanctuary.

From this small beginning in 1975, by 1980 other Indian states had joined in providing conservation measures to this species by collection of wild laid eggs for artificial hatching and rearing and the species was rapidly increasing in number and on its way to be considered as a renewable wildlife resource. The states that are now providing conservation facilities to this species includes states such as Tamilnadu, Kerala, Andhra Pradesh, Orissa, Gujrat and Uttar Pradesh with Government of India's assistance. States like Maharashtra, Madhya Pradesh and Karnataka are operating state schemes on their own. ^(Table I) ~~A list of mugger rearing stations in various states and their present stock is given in Table-I.~~

RESTOCKING IN THE WILD

Under the Indian Crocodile Projects captive reared crocodiles are being released back into the wild to restock the suitable crocodile habitat for mugger crocodiles. This operation started in the year 1977 in Andhra Pradesh since then several states have followed suit. ~~This is presented in Table-II.~~

It is important that

However, as selected restocking sites are not always protected habitats/sanctuaries, restocking programmes face difficulties on account of possible conflict from public. As such restocking sites are being chosen judiciously. *do*

CAPTIVE BREEDING

*I suppose that
Z. will do it.*

Indian Mugger Crocodile has been bred in Indian Zoos since 1960, (Honnegger, 1971). But, these were not aimed at specific conservation programmes. After the initiation of the conservation programmes several zoos and institutions have planned and achieved success in breeding the mugger crocodile. ~~This has been enlisted in Table-III.~~

SANCTUARIES

Some crocodile project states have declared new sanctuaries for this species while other states have gone ahead to restock the species in the existing sanctuaries with suitable crocodile habitats. Sanctuaries declared for the species are not meant only for mugger, but for all wildlife. In Table-IV a list of Sanctuaries in India have been given where muggers are existing at present or are being restocked.

THE FUTURE

With the future of gharial now being considered safe in India with successful rearing projects in Uttar Pradesh

Orissa and Rajasthan combined with the success in captive breeding of gharial in Orissa, the North Indian States are now keen to extend the conservation programme to the Indian Mugger Crocodile which till now has had conservation support mostly in the South.

(RSSH ref)

The immediate future programme for the species everywhere in India is ensuring its safety in its natural habitat of both the remaining wild population and the restocked population. Simultaneously with ~~approach to~~ ^{development of} rearing facilities several Indian States are interested to find out if ~~this Indian Crocodile~~ ^{mugger} can be used as a renewable wildlife resource following the economic proposition by ~~FAO~~ in their (1975 and 1970) report prepared by ~~de Ward~~ ^{de Ward}.

? What does this mean?

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Table 3

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Jan 1980 x BCC
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TABLE - I

LIST OF MUGGER REARING STATIONS IN INDIA AND THE IN STOCK

States	Rearing Centres	Year of initiation	Present stock (Approximate)	Remarks
<u>Government of India Aided Projects:</u>				
1. Orissa	1. Tikarpada	1975	15	Stock brought from Tamilnadu
	2. Similipal	1979	85	
2. TAMILNADU	1. Madras	1976	50	Part of 1976, 1977 and 1978 stock has been released back to the wild
	2. Anzaraveti	1977	200	
	3. Sathanur	1977	400	
	4. Nogganakai	1977	100	
	5. Coimbatore	1976	25	
3. ANDHRA PRADESH	1. Hyderabad	1977	200	Part of 1978 stock released back to wild
4. GUJRAT	1. Gir	1977	400	Part of 1976, 1977, 1978 stock have been sent to other states
5. KERALA	1. Noyyar	1976	50 to 100	
	2. Peruvannamuzhi	1977		
6. UTTAR PRADESH	1. Kukrail	1975	100	
<u>STATE PROJECTS:</u>				
1. Maharashtra	1. Taroba	1978	50	
2. Karnataka	1. Bennargatta	1977	50	
<u>PRIVATE PROJECTS:</u>				
1. Tamilnadu	1. Madras Snake Park, Crocodile Bank Trust, WVF aided.	1974	300	Part of 1974, 1975, 1976 stock sent to other state projects

4

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TABLE - II

MUGGER RESTOCKING IN INDIA - THEIR LOCATION AND NUMBER OF CROCODILES RELEASED

Sl. No.	States	Year of Release	Restocking Area	Number Released
1.	Andhra Pradesh	1. 1977 & 1979 2. 1980	Ethipothala Falls (Krishna River)	8
2.	Andhra Pradesh	2. 1980	Kinnerasani Sanc- tuary	33
	A.P. K.P.	3. 1980 1981	Pahad w.r. Sankhary N.S. Sankhary	128
3.	Tamilnadu	1. 1979	Krishnagiri Reser- voir	130
4.	Tamilnadu	2. 1980	Cauvery River	48
5.	Madhya Pradesh	1. 1978 1981	Sivpuri National Park	25
	Or. SSR		Similipal National Park	60

Result achieved

100% Survival

Not monitored

25% Survival

Not monitored

? * These re-introduced muggers have started breeding in the wild for the first time in the 1981...
at EP Falls in AP
successfully

~~2% color~~
Results achieved

concl used?

Sampled and years

TABLE - III

INSTITUTIONS BREEDING MUGGER IN CAPTIVITY

Institutions	Year of Breeding	Information Source
1. Ahmedabad Zoo	1960 (7) onwards	David Reuben (1969)
2. Baroda Zoo	1960 (7) onwards	International Zoo Year Book Vol.9
3. Jaipur Zoo	1960 onwards	I.Z.Y.B. 2 Mahendra Prakash (1973)
4. Madras Snake Park & Crocodile Bank	1974 onwards	Whitekar, R (Pers. Comm.)
5. Delhi Zoo	1976 onwards	Peter, M.D. (pers. Comm.)
6. Vizag Zoo	1977 onwards	< Pers obs
7. Hyderabad Zoo ^{NZP*}	1980	< Pers obs

INSTITUTIONS ATTEMPTING CAPTIVE BREEDING:

1. Mandan Kanon Biological Park (Orissa) *
*Falguni Sakhinagar Sanat ** ()
2. Bannerghatta (Karnataka)
*Grounds Rihill Cole **
3. Kukrail (Uttar Pradesh)

Note — inst (*) are fully the sole ground components of the Govt Forest
Council B & M.

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TABLE - IV

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WILDLIFE SANCTUARIES FOR MUGGER RE STOCKING

State	Sanctuary	Remarks
ANDHRA PRADESH	1. Manjira Wild Life Sanctuary	Wild Population
	2. Lanjanadugu W.L. Sanctuary	-do-
	3. Nagarjunasagar-Erisailem W.L. Sanctuary	Wild Population + <i>Restocked</i> to be restocking area
	4. Kinnerasani W.L. Sanctuary	Restocked
	5. Pakhal W.L. Sanctuary	<i>Restocked</i> Wild Population + proposed restocking area
GUJRAT	1. Gir W.L. Sanctuary	Wild Population
TAMILNADU	1. Annamalai W.L. Sanctuary	Wild Population
	2. Moyar - Keddarhalls	Proposed Sanctuary
ORISSA	1. Similipal National Park	<i>Restocked</i> To be restocked
	2. Hadgarh	
KERALA	1. Neyyar W.L. Sanctuary	Wild Population and
	2. Perambikulam W.L. Sanctuary	to be restocked
UTTAR PRADESH	1. Corbett National Park	Wild Population
	2. Dudwa National Park	
MAHARASHTRA	1. Toroba National Park	Wild Population

Final Draft

BCL

CONSERVATION STATUS OF INDIAN MUGGER CROCODILE (Crocodylus
palustris Lesson,) IN INDIA IN 1980

INTRODUCTORY

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Great concern was expressed by Crocodile Conservationists both in India and abroad on the rapid decline of the Mugger Crocodile (Crocodylus palustris) in India, vide Gee (1964), Mishra (1970), Daniel (1970), Biswas (1970), Seshadri (1969) Bustard (1969 and 1971) and Honnegger (1971). Government of India provided total legal protection to this species by enlisting it in schedule I of the Indian Wildlife (Protection) Act of 1972. ^{Bustard} In the ^{ed} FAO (1974) report the status of this species in India was defined rather vividly. ^{as "greatly depleted in number, and} ^{to} Being very ^{must be considered rare in most, if not all, of its former range.} widely distributed in the Indian sub-continent it can be considered as the truly Indian Crocodile. This has ^{Due to} happened because of the species's great adaptability to different kinds of fresh water habitat including village tanks.

By 1974, when the Government of India Crocodile Project with FAO/UNDP assistance was initiated, all out efforts to save the critically endangered gharial (Gavialis gangeticus) and the estuarine crocodile (Crocodylus porosus) overshadowed the ~~true~~ Indian Crocodile - the Mugger.

CONSERVATION PROGRAMMES

Initial conservation efforts from 1974 onwards for this species was confined to Madras, where the WWF - India aided Madras Snake Park Trust was trying to collect wild

contd..2..

laid mugger eggs in Tamilnadu for artificial hatching and rearing. In 1975, the Orissa State Crocodile Project brought this species into the folds of their Crocodile Rearing Programme and started rearing muggers in their pilot rearing centre at Tikerpada along the banks of river Mahanadi in the Satkosia Gorge Sanctuary.

From this small beginning in 1975, by 1980 other Indian states had joined in providing conservation measures to this species by collection of wild laid eggs for artificial hatching and rearing and the species was rapidly increasing in number and on its way to be considered as a renewable wildlife resource. The states that are now providing conservation facilities to this species includes states such as Tamilnadu, Kerala, Andhra Pradesh, Orissa, Gujrat and Uttar Pradesh with Government of India's assistance. States like Maharashtra, Madhya Pradesh and Karnataka are operating state schemes on their own. A list of mugger rearing stations in various states and their present stock is given in Table-I.

RESTOCKING IN THE WILD

Under the Indian Crocodile Projects captive reared crocodiles are being released back into the wild to restock the suitable ^{protected} crocodile habitat for mugger crocodiles. This operation started in the year 1977 in Andhra Pradesh. Since then several states have followed suit. This is presented in (Table-II.)

However, as selected restocking sites are not always protected habitats/sanctuaries, restocking programmes face difficulties on account of possible conflict from the public. As such ~~restocking sites are being chosen~~ ^{it is important that} judiciously.

CAPTIVE BREEDING

Indian Mugger Crocodile has been bred in Indian Zoos since 1960, (Hennegger, 1971). But, these were not aimed at specific conservation programmes. After the initiation of the conservation programme several zoos and institutions have planned and achieved success in breeding the mugger crocodile. ~~This has been enlisted in (Table-III.)~~

SANCTUARIES

Some crocodile project states have declared new sanctuaries for this species while other states have gone ahead to restock the species in the existing sanctuaries with suitable crocodile habitats. Sanctuaries declared for the species are not meant only for mugger, but for all wildlife. In Table-IV a list of Sanctuaries in India have been given where muggers are existing at present or are being restocked.

THE FUTURE

With the future of gharial now being considered safe in India with successful rearing projects in Uttar Pradesh

(David
(Prakash

Orissa and Rajasthan combined with the success in captive breeding of gharial in Orissa, the North Indian States are now keen to extend the conservation programme to the Indian Mugger Crocodile which till now has had conservation support mostly in the South.

The immediate future programme for the species every where in India is ensuring its safety in its natural habitat of both the remaining wild population and the restocked population. Simultaneously with ^{developments} newer ~~approach~~ ^{to} rearing facilities several Indian States are interested to find out if this Indian Crocodile can be used as a renewable wildlife resource following the economic proposition by ~~FAO in their 1975 and 1978 report prepared by de Ward.~~ ^{of (De Ward 1975, 1978)}

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TABLE - I

LIST OF MUGGER REARING STATIONS IN INDIA AND THEIR STOCK

States	Rearing Centres	Year of Initiation	Present stock (Approximate)	Remarks
<u>Government of India Aided Projects:</u>				
1. Orissa	1. Tikerpada	1975	15	Stock brought from Tamilnadu
	2. Similipal	1979	76-257	
2. TAMILNADU	1. Madras	1976	6050	Part of 1976, 1977 and 1978 stock has been released back to the wild and sent to other states.
	2. Amravati	1977	300	
	3. Sathanur	1977	400	
	4. Hoggenakal	1977	100	
	5. Coimbatore	1976	25	
3. ANDHRA PRADESH	1. Hyderabad	1977	200 200	Part of 1977 stock released back to wild
	1. Gir	1977	400	Part of 1976, 1977, 1978 stock have been sent to other states
5. KERALA	1. Neyyar	1976	50 to 100	
	2. Peruvannamuzhi	1977		
6. UTTAR PRADESH	1. Kukrail	1975	100	
<u>STATE PROJECTS:</u>				
1. Maharashtra	1. Taroba	1978	50	
2. Karnataka	1. Bannergetta	1977	50	
<u>PRIVATE PROJECTS:</u>				
1. Tamilnadu	1. Madras Snake Park, Crocodile Bank Trust, WWF aided.	1974	300	Part of 1974, 1975, 1976, 1977, 1978 stock sent to other state projects

TABLE - II

MUGGER RESTOCKING IN INDIA - THEIR LOCATION AND NUMBER OF
CROCODILES RELEASED

Sl. No.	States	Year of Release	Restocking Area	Number Released
1.	Andhra Pradesh	1. 1977 & 1979, 1980	Ethipothala Falls (Krishna River)	8
2.	Andhra Pradesh	2. 1980	Kinnerasani Sanctuary	33
3.	Andhra Pradesh	3. 1980	Palkhal Wildlife Sanctuary	15
4.	Tamilnadu	1. 1979	Krishnagiri Reservoir	130
5.	Tamilnadu	2. 1980	Cauvery River	48
6.	Madhya Pradesh	1. 1978	Hirap Lake Sivpuri National Park	25 25 10

Results Achieved

Label ✓

100% Survival

Not monitored

Not monitored

25% Survival

Not monitored

Not monitored

TABLE - III
INSTITUTIONS BREEDING MUGGER IN CAPTIVITY

Institutions	Year of Breeding	Information Source
1. Ahmedabad Zoo	1960 (?) onwards	David Reuben (1969)
2. Baroda Zoo	1960 (?)	International Zoo Year Book Vol.9
3. Jaipur Zoo	1962 onwards	Mahendra Prakash (1973)
4. Madras Snake Park & Crocodile Bank	1974 onwards	Whitekar, R (Pers.Comm.)
5. Delhi Zoo	1976 onwards	Peter, M.B. (pers.Comm.)
6. Vizag Zoo	1977 onwards	
7. Hyderabad Zoo	1980	

INSTITUTIONS ATTEMPTING CAPTIVE BREEDING:

1. Nandan Kanan Biological Park* (Orissa)
2. Satkosa Gorge Sanctuary
3. Bannerghatta (Karnataka)
4. Kukrail (Uttar Pradesh) *Ornithological Rehabilitation Centre*

TABLE - IV
WILDLIFE SANCTUARIES FOR MUGGER RESTOCKING

State	Sanctuary	Remarks
ANDHRA PRADESH	1. Manjira Wild Life Sanctuary	Wild Population
	2. Lanjemadugu W.L. Sanctuary	-do-
	3. Nagarjunasagar-Srisailem W.L. Sanctuary	Wild Population + future restocking area
	4. Kinnerasani W.L. Sanctuary	Restocked
	5. Pakhal W.L. Sanctuary	Wild Population + proposed restocking area
GUJRAT	1. Gir W.L. Sanctuary	Wild Population
TAMILNADU	1. Annamalai W.L. Sanctuary	Wild Population
	2. Moyar - Keddarhalla	Proposed Sanctuary
ORISSA	1. Similipal National Park	To be restocked
	2. Hadgarh	
KERALA	1. Neyyar W.L. Sanctuary	Wild Population and to be restocked
	2. Perambikulam W.L. Sanctuary	
UTTAR PRADESH	1. Corbett National Park	Wild Population
	2. Dudwa National Park	
MAHARASHTRA	1. Taroba National Park	Wild Population
