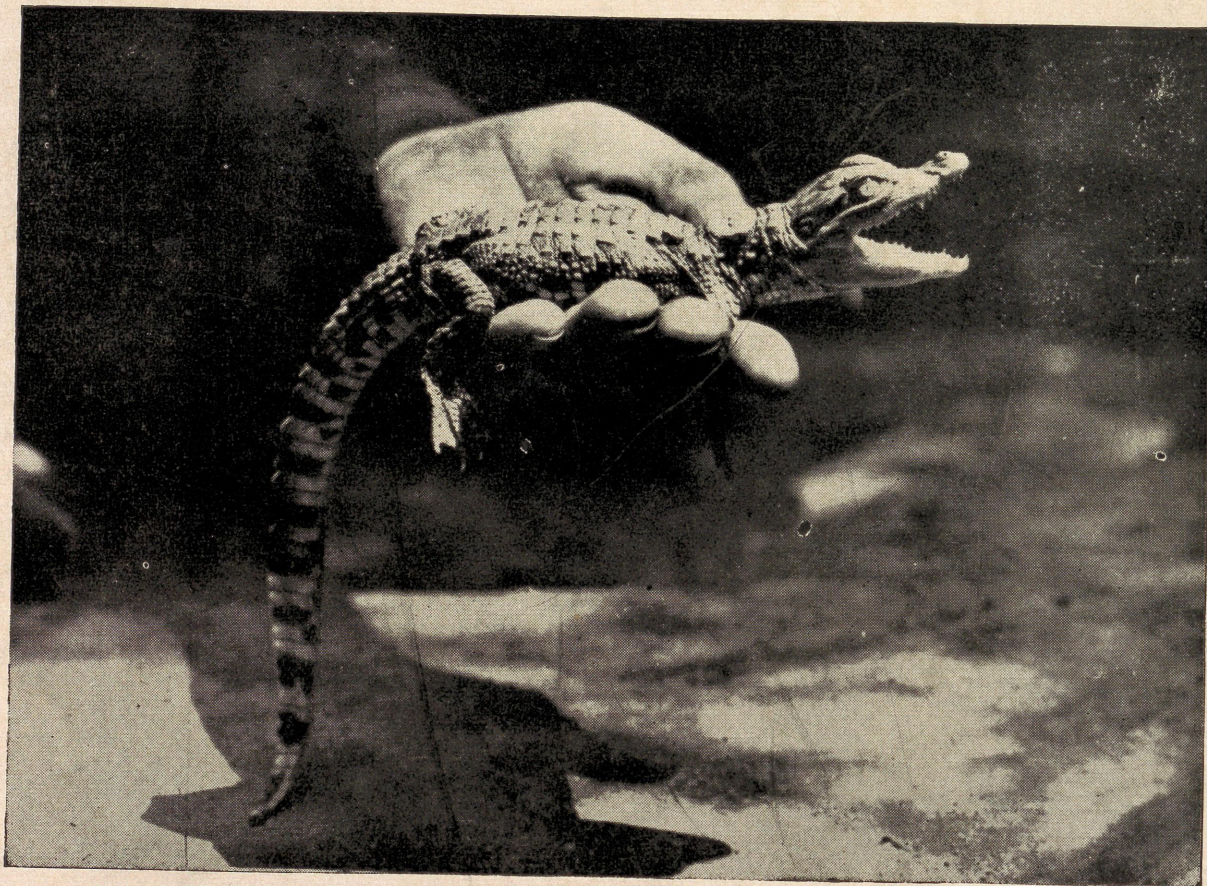


1974



Dead Marsh Crocodile in an Indian National Park



Baby Marsh Crocodile, hatched at Madras Snake Park, June, 1974.

1974

HABITATS VISITED BY M.S.P.T

1974	1975
1. CHIDAMBARAM	① CHIDAMBARAM
2. KILLIKUDU	② KILLIKUDU
3. METTUR RESERVOIR	③ Amaravati Dam
4. SATHANUR RESERVOIR	④ Bhavani Sugar Jams and Majan
	⑤ Kedarhelli stream
	5. HOSENAKAL
	6. SATHANUR
	7. Elathur (Cheruvu)

1976

- 1.
- 2.
- 3.
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- 6.
- 7.
- 8.
- 9.

NOTES ON BEHAVIOUR, ECOLOGY AND PRESENT STATUS OF THE MARSH CROCODILE (*Crocodylus palustris*) in South India.

Introduction

The Madras Snake Park Trust, Project No. 631 of the World Wildlife Fund, started a crocodylian study project in Kerala, Karnataka and Tamil Nadu with the aid of the World Wildlife Fund in 1973. The aim of the study is to determine the present status of *C. palustris* in South India.

Methods

1. Crocodile investigation proformas were sent to Forest Department, Fisheries Departments, and others. (Sample included).
2. Field investigations in areas where *C. palustris* has been reported.
3. Collection of eggs from the wild, under Forest Department permit.

Results

The results of the survey show that the marsh crocodile is going the way of most of the world's crocodylians. The total population in the South Indian states is probably a few thousand. (Kerala, Karnataka and Tamil Nadu).

Future proposal

Captive breeding may be the only way to ensure the survival of *C. palustris*. The Madras Snake Park Trust has drawn up a proposal for a crocodile breeding farm for approval and financial help from the World Wildlife Fund and the International Union for the Conservation of Nature. The Snake Park has now 28 marsh crocodiles, but we hope to include *C. porosus* and *Gavialis gangeticus*, both endangered species, at a later date. Plans include purchase of land on the Mahabalipuram road, construction of rearing and breeding areas, and accumulation of breeding stock.

Note: (i) Although our main project activity has been confined to Tamil Nadu and Karnataka, notes are included for the states of Maharashtra, Kerala and Andhra Pradesh since very little data of this kind has been compiled and recorded in recent years.

(ii) 2nd printing, April 1975. The Snake Park now has 4 acres of land for the crocodile breeding farm. Development of the project has begun with WWF support.

R. WHITAKER
MADRAS SNAKE PARK TRUST
GUINDY DEER SANCTUARY
MADRAS-600 022.
AUGUST 1974.

Chidambaram Waterworks - Tamil Nadu

Description: Three miles south of Chidambaram at Vakkaramari is the 40 acre Waterworks with its two large tanks, feed canal and pumping station. No one is quite sure when crocodiles were first seen here but being the delta area of the Cauvery and Coleroon Rivers there were plenty of crocodiles 30 to 40 years ago in this area.

Population: The crocodile population at Chidambaram is 15 to 20. 6 are about one metre in length; the rest are adults and sub-adults. The three largest are 2.5 or 3 metres in length. There were no signs of the over 20 young which hatched in 1973, the nest and empty shells of which were found by the Superintending Engineer on 10th July a day or two after hatching. Earlier in the year mating activity was observed during the latter half of January and trial nest digging around April 20th. This would indicate a gestation of 80-95 days, incubation for 70-80 days. The nest site in this case was 8 ft. above water level on open ground. The empty nest hole was about 30 cms across by 50 cms deep. Remains of 29 eggs were found. Each egg measured 55mm. by 80mm.

Habits: There is little human disturbance at the tanks and the crocodiles often bask completely out of water. On occasion we could approach them within 20m before they entered the water; sometimes a croc would prop itself up on clumps of floating grass and bask near the shore. The larger crocodiles often basked on the wind-protected centre bund on or very close to the water edge.

An average activity pattern of three crocodiles which we saw in the same spots nearly every day was:

May 15 Temp: 85-95°F.

6 a. m.—croc comes up to breathe, facing shore 100m out

7 a. m.—croc is about 50m from shore

8 a. m.—croc is 10m from shore

9 a.m. — croc basks semi-submerged at edge of water

9-30 a.m.—croc moves gradually up the bund embankment and basks in sun, mouth often wide open

11-30 a. m. to 12 noon the croc would slide back into the water and float in that vicinity, very often in the middle of a small grass clump.

In the afternoon basking was less, perhaps because of the brisk north-west breeze that came up by 2 p. m.

While basking the crocodiles were closely attended by Pond Herons (*Ardeola grayii*), up to eight per crocodile. No bird got closer than one metre to a croc and would jump back if it moved. The birds fly up in alarm when a human approaches and make close approach very difficult. While floating with top of head, eyes and ears above water, crocs are frequently dive bombed by Pariah Kites (*Milvus migrans*). The kite is either harassing or mistaking the head for some edible floating matter. The croc rears head and neck dramatically out of the water and snaps whenever this happens. Red-wattled Lapwings (*Lobivanellus indicus*) keep the crocodiles informed about human presence and movements.

Mating behaviour was noted in late January and February in the last three years. The male swims along on top of the female, both their heads well out of water and as mating occurs both heads go under. This activity is observed in the day time for two to three days.

The female was observed digging three or four "false" or "trial" nests during the day time in April, several days before actually nesting. She digs with alternate scoops of her hind feet, lays the eggs, covers them, making only a slight mound hardly distinguishable from the bund embankment. She does not seem to stay in the vicinity to protect the eggs. The eggs hatch in June and July each year and the young appear to stay in the water just near the nest locality for at least one month before dispersing.

The local people of the area are full of old stories which indicate the one-time prevalence of crocodiles. Several people mentioned that croc meat is a delicacy, and that a baited hook is the most effective way to catch a croc. Some years ago a boy was attacked by a crocodile in the canal, he was badly wounded but recovered. There are no other records of attacks on humans, a few goats are pulled in each year.

Protection : Because of expanding human settlements and heavy hunting and trapping pressure crocodiles can survive in 1) inaccessible or Sanctuary areas, 2) vast reservoirs like Mettur and 3) locally protected places like the Chidambaram Waterworks. The Superintending Engineer of the Chidambaram Waterworks, Mr. Vijayaraghavan, has taken a keen interest in preserving this small but important breeding population. It is certain that crocodiles cannot survive in such places, surrounded by cultivation and human settlements, unless there is a strong personal interest in protecting them. The Tamil Nadu Forest Department is developing this water works into a crocodile farm or preserve. A wall or special fencing would prevent the crocs from straying but would also keep them feeding in the canal. Deepening the ponds would be necessary for drought years.

Note : Night observation with a powerful torch on moonless nights is found to be the best method of censusing crocs in their natural habitat. The light should be shone from eye level. Croc eyes glow bright red and approximate size of the animal can be judged by distance between the eyes. Frog eyes are smaller pin points of red light. See Appendix for flora and fauna of Chidambaram.

Veeranam Tank near Chidambaram : Dry, broad expanse of shallow water, surrounded by farms and villages. Part of the Cauvery River System. During high water one or two crocs end up in these large bodies of water which are however too low in summer to support a population of crocodiles.

Elementary Analysis of *C. palustris* Feces Collected at Chidambaram.

May 20th, 1974

Sixty pieces of feces, representing about thirty defecations were collected on the bund embankments at Chidambaram, V. C. Rajamani, our Tribal Assistant examined them and made the following findings :

- | | |
|---|------|
| 1. Fish scales | 10% |
| 2. Rat (<i>Bandicota bengalensis</i>) | 100% |
| 3. Jerbil (<i>Tatera indica</i>) | 20% |
| 4. Snakes (<i>Xenochropis</i> , <i>Amphiesma</i>) | 10% |
| 5. Birds | 10% |

Most of a crocodile's meal is completely digested and so while this list does not give a fair analysis of what they eat, it shows that during harvest season rats are a major part of the *C. palustris* diet at Chidambaram.

As reported by several authors, *C. palustris* digs deep tunnels to escape drought and summer heat. A few years ago a tunnel one metre in diameter (under the waterline) was found to go right through the centre bund, a distance of over 6m. It collapsed soon after. Several small tunnel beginnings were found, none of them more than a metre in depth.

Every night one or more crocs cross the bund and go into the Raja Anicut to try and get fish, crabs etc. They follow well used trails and invariably defecate while making the crossing, marking their trail effectively, like the white line in the middle of a highway. They generally cross between 8 and 10 p.m. and come back to the tank before 4 a.m. Several times crocodiles have been found in the rice fields; sometimes they are killed and sometimes returned to the tanks. In December 1973 a 2.5m croc was caught in a canal by poachers with a dog-baited hook and killed at Kumaratchi about 26 kms from Chidambaram. In the severe drought of 1969 all the crocodiles scattered. Some came back on their own but several others ended up in rice fields and irrigation canals nearby. At least one adult was killed but the rest were brought back by the Suprintending Engineer with police help.

Kilikudi "Crocodile Farm"-Tamil Nadu

Description : About 10 km from Tiruchirapalli is Kallanai (Andanallur Panchayat), the Grand Anicut of the Coleroon River. From here a one mile walk takes you to Kilikudi village, where the proposed crocodile farm of the Tamil Nadu Forest Department is located. This is a three to four acre pond choked with hyacinth and tall grass. It is 6-10 metres deep and has 2-4 acres of land surrounding it, mostly grassy with bushes and large trees. The Grand Anicut of the Coleroon River is 300 metres away and the crocs move between the river and the tanks at night. Trees here are coconut, (*Cocus nucifera*), neem (*Azadrachta indica*), mango (*Mangifera indica*), teak (*Tectona grandis*), rain tree (*Samanea saman*) and poplar.

Population : We counted 12 and possibly up to 15 crocs at midnight by torch light. There are said to be about 20 here, the biggest one being 3m.

Habits : At midnight several crocs were induced to come close by mimicing the juvenile croc distress cry. One, 3m long, charged us open mouthed for about 10 metres from the shore side where it had been lying unseen. Then it dove sideways into the pond. This is a common crocodilian reaction to the distress cry and may be a protective or cannibalistic reaction.

We saw the remains of two nests, both about 2-3m. above the water line on exposed clay slopes, shell fragments were visible and it appears that they hatched two weeks earlier than the Chidambaram crocodiles (around 24-6-73). We also saw two crocodile "caves" dug into the embankment. One was 2.5m deep and 1m. in diameter, running parallel into the bank a foot above the present water line, perhaps dug as a refuge for the hot season. The tank abounds in fish and the crocs manage to catch a goat every now and then; however, cows, buffaloes and people bathe there regularly.

Protection : When we visited this pond on 24th July '73, we found no Forest Department Watcher there but instead a man with a shotgun in a large tree overlooking the pond. In spite of the Forest Dept. sign-board we saw another party of hunters that day, and people fishing in the pond.

Some land around the pond is owned by local people and should be bought up by the Forest Dept for the farm. It is vital for the survival of the population that the pond be fenced in and a reliable watcher posted at the site.

Being close to the dam at Grand Anicut the area could attract tourists if advertised. So as not to interfere with breeding activity, tourists should be allowed only limited access. If regular feeding is to be done (it is done now) it should be at a time when tourists can get a clear view of the animals. As natural and wild a state as possible should be maintained so that this area could serve as a place for studying this endangered species.

Mettur Reservoir, Salem District, Tamil Nadu

Description : A 96 sq km body of water. During high water the maximum depth is 30 m. Below the dam are deep pits in the Cauvery river bed known as "mudagoos" where large fish and occasional crocs can be seen in the summer. Across the reservoir (50 kms.) is a wild area with elephants, Hogenakal.

Population : No census carried out.

Habits : Crocodiles are most easily observed when the water level is low, in May. They are usually seen at one particular area of sandy shore.

Protection : Numbers have diminished drastically due to poaching. Young crocs and sometimes big ones are caught in nets. Regular poachers appear to be those with fishing contracts. They use firearms but more often large treble hooks baited with duck or rotten meat. Skins are sold to dealers in Mysore and a big skin may fetch Rs. 400.

Even though only part of the reservoir is used for fishing, 300 to 400 tons of fish are removed every year.

Some effort on the part of the Forest Department to save the Mettur crocodiles would be welcome. Protection of their breeding and basking areas would not be difficult if they concentrate in one area. The Fisheries Department inspectors patrol every day to check fish poaching and could also check, report and investigate croc poaching. Mettur has tremendous potential for supporting a large crocodile population.

Sathanur Reservoir, South Arcot Dist., Tamil Nadu

Description : Ponnaiyar River comes from the Chennakesa Hills in Karnataka, runs through 50 kms there and enters Tamil Nadu. It goes to the sea at Cuddalore. It is linked with the Cauvery during high water. In summer water is confined to a small deep area near the dam. The Sathanur area is Reserve Forest; relatively intact scrub jungle surrounding the reservoir although there is a road to Pachar via Thamupadi and Mothakel.

Population : No census taken.

Habits : Crocodiles are said to be in deep pools in the upper reaches of the reservoir at Padithorai (Valiyar). The day we were there a fisherman saw one.

Protection : Some Irula tribals near Sathanur told us that catching crocs with hooks baited with rats used to be common and is still done occasionally. Last year a croc was caught in one of the fishing nets and killed. The skin was auctioned by the Fisheries Department to Fitwell Handicrafts, 64 Peters Road, Madras-6, for about Rs. 150! In a follow up visit by one of the Madras Snake Park Irulas, V. C. Rajamani to locate nests, he found that local Irulas had collected and eaten eggs from three nests in early May. Unless strict protection measures are taken and the Fisheries Department is enlightened about croc preservation and laws, it might be too late to save the crocs here.

Ranganithitoo Bird Sanctuary, Mandya Dist., Karnataka

Description : Bird Sanctuary on the Cauvery River.

Population : Present population 7 crocodiles, some of which are 3m in length. Night count showed 5 crocs.

Habits : There was no response to the juvenile distress cry may be because of fear of the boat. Forest Guards say that January to April is a good time to see crocs.

Protection : The Forest Department is thinking of enclosing one of the river islands here to rear crocodiles. Protection would be easier as it is already a Sanctuary, however this activity should in no way interfere with the birds.

Captive Crocodiles

The Madras Snake Park has been keeping crocs for four years and is building up a breeding stock of the rare *C. palustris*. At the time of writing we have one adult male, two adult females, ten sub-adults 3-5 years old, and fifteen juveniles.

Enclosures : Crocodiles climb wire mesh and 2" chain linking very efficiently. One 2 m male climbed over a 1.5m. fence which was specially made with the top curved in. Smooth cement or stone walls seem to be best for crocodilian enclosures.

Food : Live frogs seem to be a good initial food for hatchling crocodiles. In the wild they feed on a great variety of things from insects to small mammals and if available this diet should be duplicated. Fish are cheap and easy to get but some crocodilians are choosy and won't take dead fish. Plain meat is an insufficient diet. Rats are given to supplement the mainly frog and fish diet. A light bulb placed in the enclosure will attract insects for young to feed on.

Reaction to Distress Cry : While catching a young *C. porosus* (which was with some *C. palustris*) for measuring, it started croaking the odd crocodilian distress cry. Unhesitatingly, five metre long *C. palustris* charged the handler across the enclosure, snapping; only a quick jump saved him injury. Later we recorded this crocodile and elicited a second dramatic display later the same day in which there was a full scale attack on the tape recorder. After two or three repetitions the attack response quietened to a mere raising of the head or turning in the direction of the sound. In the field, hidden in grass blinds and using a spot light at night we successfully mimicked the nasal "wah, wah" of crocs in distress and called adults to within five metres.

Vocalisation : One of our correspondents, Mr. R. Menon writes that he recently observed an adult crocodile at the Calcutta Zoo raise itself up and give vent to a not loud but penetrating nasal roar. Our crocodiles carry on a soft grunting chorus very often; young and adults take part in it and it goes on for five minutes or less. Grunting usually takes place in the evening. Thunder and other loud noise will start them off.

Basking : One adult crocodile from a tank in the wild was put into the croc enclosure here. While it was basking in the sun gaping, we could see 30-40 leeches lining the inside of the month. After several days of basking, the leeches were absent. This demon-

strates that gaping while basking serves to get rid of parasites, besides the ectothermic reptile's thermoregulation needs. The same croc was observed catching crows which hopped too close while it was basking.

Mating : In February 1974 when our new croc enclosure was completed we released the first pair of adult *C. palustris* into it. Both had been raised in isolation for over fifteen years, one in an aquarium, the other at a University. Mating behaviour was observed the next day, the male floating on top of the female, evidently trying to mate. More recently (mid March) some sub-adult crocs were put in the same enclosure and the adult female made aggressive advances toward them. She does not bite with much conviction, being content with herding them around tail thrashing back and forth, similar to other reptiles when threatened or threatening.

Breeding : Whether *C. palustris* will breed in captivity has happily been proved by the Jaipur Zoo, Rajasthan where a female croc has mated and laid eggs for the last twelve years. The following are the records for '67 through '71 (Journal of the BNHS Vol, 68 (3) :

Average clutch size : 32 eggs

Average incubation time : 54 days

Average number of young hatched and survived : 25

Hatching success : 77%

The Ahmedabad and Baroda zoos also report breeding success.

Disorders in Young Crocs : Two important disorders of captive young crocodilians are : 1. Hump back due to calcium deficiency. Can be cured by including bone in diet, block of solid calcium sulphate (plaster of Paris) in the pond 2. Loss of toes and teeth due to deficient diet and lack of calcium. Diet of whole animals such as frogs and rats is recommended.

**Growth : GROWTH CHART FOR CAPTIVE *C. PALUSTRIS* AT
MADRAS SNAKE PARK.**

Date of Birth : June 1971

Number of specimens : 6

Average figures for 6 specimens :

Date	Length	Girth	Weight	Diet
9— 7—1971	30 cms	10 cms	75 gms	Small living frogs and insects
15— 8—1971	35 cms	13 cms	145 gms	Small living frogs
7— 4—1972	58 cms	21 cms	380 gms	Frogs, fish, mice.
4—11—1972	82 cms	30 cms	2300 gms	Frogs, fish
10— 2—1973	84 cms	30 cms	2500 gms	Fish
11— 2—1974	123 cms	48 cms	10 kgs	Frogs, rats

NOTES ON NESTING

Nest hole digging at Chidambaram usually commences from mid April onward. At Chidambaram there seem to be 3 or 4 adult females involved, and each digs 2 or 3 "trial" nest holes before laying.

Chronological account - April-May '74

1. April 18th-20th: First trial nest digging along south facing bank of centre bund.
2. April 27th, 28th, 29th—Three trial nests were dug next to the pump house building 65m. from tank. Adult croc observed by night watchman at 8-9 p.m. using its' front feet to dig and inserting snout in hole. The croc hissed when approached and went back to the tank.
3. May 1st—Two open nest holes discovered on centre bund. Shell fragments were scattered around and there was only one intact egg in each hole. Monitor lizards may have been the culprits, as there were tracks.
4. May 17th—We arrived and found a total of 12 trial holes and empty nests. Nest 1 and 2 were empty, with shell fragments lying outside. Deep claw marks were obvious in all diggings and it appears that the hind feet must be used to get through the hard sun-baked clay. Both nests were about 5m. above the water line. Opening of holes were about 30 cms diameter depth 32 cms and total length of nest hole inside 40 cms.

5. After careful searching and trial digging we found one good *C. palustris* nest (Nest 3) 3m above the water line in the open with no grass or shrubs within 1/2 metre and unshaded by any trees. The nest was located by looking for clods of dirt dug out by the female which had rolled down and come to rest below the nest. Nest No. 3 had a mouth 28 cms wide. The eggs were 12 cms below the ground surface, depth was 30 cms and total inside length 56 cms.

There were 33 eggs in this nest hole in roughly three layers, the last eggs being up and inside the gourd-shaped hole. 6 eggs were damaged during the discovery and removal or cracked by the female during laying. One was a large, double deformed egg which was slightly cracked and the contents rotten. Some of the inner eggs were firmly stuck to the nest wall and upon removal small pieces of the outer calcareous shell were stuck to the sides; this accounted for two of the six damaged eggs.

The eggs were dull white and "banded", part of egg was translucent. The exterior was extremely brittle. The eggs were marked and packed into nest earth in a large bucket in their relative positions in the nest. The 8 a. m. surface temperature was 92°F. 30 cms underground in the nest cavity the temperature was also 92°F.

6. Nest 4 was located at midnight on 19-5-74 on the Coleroon River near Grand Anicut, close to the Forest Department Crocodile Farm, Tanjore District, during night count and observation there. The nest was 3m away from the water and 2m above water level. Evidence of the nest was the fairly round dirt filled hole flush with the ground, devoid of grass. The eggs were covered by 15 cms of dirt. The hole diameter was 25 cms, total depth 40 cms. It was slightly jug shaped as in the nests described above. The soil is fine and black with some sand. There was some dry grass mixed with the soil covering the eggs. Starting 15 cms below the surface the soil packs into a firm shape when squeezed. Air temperature: 81°F, bottom of nest after egg removal, 88°F. The nest cavity felt warmer than surrounding earth.

The eggs were packed in a wooden box with nest earth and grass. They were immediately transferred to Madras by train.

7. Nest site No. 5 was shown to us by Forest Department guards at Ranganthitoo Bird Sanctuary on the Cauvery near Mysore. It was located in a freshly plowed field 6m from the water edge and about 2.5 m above the river level. The earth is coarse and loamy. Nest size could not be measured as it was dug out. Temperatures were: Water, 82°F, Air (shade) 88°F, 50cms underground 86°F.

The Game Guard at Ranganthitoo said that on 18th May he saw a croc about 2.5m long with its' head and front feet in a shallow hole on the edge of the field. When he was 15m away it hissed and turned, going down the slope to the waters' edge. As it turned the guard saw the heads and tails of at least 3 hatchlings between its' teeth. We particularly asked if the young were giving distress cries. The guard replied in the negative, and said that the large croc's mouth was partly open. This suggests that the parental release of young and transfer to water noted in other crocodilians (Cott, Africa) is also true of *C. palustris*. According to Alvarez, Mexico, the male or female caiman can take this role. The 22 hatchlings found at Ranganthitoo were transferred to Mysore Zoo by the Forest Department.

74 season
33 eggs (nest)
from Chidambaram

KILLIKUDUR
or
MADRAS
(22 eggs)

MYSORE

Hatching and Rearing Notes

Deriyaganala gives egg laying and hatching data for *C. palustris kimbula* but the only data we have for the Indian sub-species is that from captive breeding records in Ahmedabad and Jaipur zoos.

The collection of eggs and captive rearing of young to a size suitable for release in protected areas seems to be one of the most important crocodylian conservation measures that can be undertaken. We have made use of the IUCN Crocodile Specialist Group experience for collection, transport, incubation and rearing techniques.

Fifty-four *Crocodylus palustris* eggs were collected during May from two nest sites, Srirangam and Chidambaram in Tamil Nadu and transported to the Madras Snake Park by train in cushioned containers. Egg collection was affected early in the laying season both for ease of nest site location and on the assumption that young eggs are hardier for transport than developed embryos. The eggs were brought to the Snake Park within 12 hours of their collection, packed in the nest earth with straw and grass.

Hatchery

A walled enclosure of 20 ft. diameter with a wire mesh dome and partly shaded by trees was used as a hatchery. (Predators like jackals, mongoose and monitor lizards are common in the area). A careful check was kept to eliminate ants. The eggs were packed into wooden boxes about one metre sq. spaced about an inch apart in one layer and covered with about 9 cms of original nest earth. Eggs were placed as marked during collection, top side up. Earth was made moist enough to press into a ball. Thermometers were placed in the boxes to keep a regular check. Cracked eggs were incubated separately in case ants and other insects attacked them. (Two of these hatched: so retaining them seems justified provided the inner leathery layer is intact) Temperature was controlled by placing palm leaves over the dome. The hatching boxes were protected from evening showers. The hatchery is of course not open to public.

Hatching Details

On June 11th (22 days after collection) at 7-30 a. m. croaking sounds were heard from the Sri Rangam hatching box. At 10-30 a. m. earth was removed from around and above the eggs and one hour later the first baby emerged. By 4-30 p. m. seven had emerged and the next day an additional five. One more hatched but was weak, with distended belly and unabsorbed yolk material hanging from the umbilical area. It died shortly afterwards. The young were kept in the hatching box overnight and allowed to enter the shallow adjoining pond the next morning. The hatchery and pond were then well shaded with palm leaves. Two of the young had slightly curled tails, which might have been caused by over heating during incubation.

On June 24th at 12 noon (39 days after collection) croaking was heard from the Chidambaram box. In the evening when it was cool, earth was scraped off the top of the egg layer. A protruding nose was visible and a healthy croc hatched by 7 p. m. The next morning another hatched, healthy but with a slightly curled tail. The same day one of the cracked eggs (Chidambaram) hatched. The hatchling was weak with distended belly, not reacting in the hissing, snapping manner of a normal healthy hatchling. After 24 hours it had picked up strength and was placed in the pool.

On June 27th another egg hatched from the Chidambaram box. The baby was extremely weak, with a very distended belly and tail shortened and curled. It was soaked in warm saline but died within six hours.

13 out of
21 eggs

4 out of
33 eggs
from
Chidambaram

**Extract from letter from Mr. A. C. Pooley, IUCN Crocodile Specialist,
Zululand on collection and incubation of crocodile eggs (8-8-'74)**

.....One can find healthy, rotten and infertile eggs in the same nest depending upon the situation of the nest, the type of soil, temperatures and moisture within the nest chamber. Usually the eggs that never develop are at the bottom and apparently do not develop because it is too cool and moist, and often the uppermost eggs receive too much heat and can either be liquid and rotten, or else hard as you describe.

Make sure that when collecting eggs from a nest that you mark them with indelible pen, showing the precise position of each egg as it is situated. Eggs are then packed in boxes in the same position as in the nest, transported and artificially incubated in this same position.

Often a large clutch will occupy two or three separate tiers of eggs, so remove the top layer and mark them A, dig out the 2nd layer and mark B and the bottom layer as C. Once the entire clutch has been removed, put back the C's, B's and finally the A's—into your transport box.

As a matter of interest, I transport eggs packed in straw, dried grass, leaves or vegetation of any kind, gathered at the nest. I find that eggs in a box of sand, move, roll and generally shift around with vibration of being on the back of a vehicle. Packed in vegetation, that is sprinkled with water till nice and damp, and provided the air temperature is of a normal warm day, the eggs can be transported hundreds of miles, over three or four days without damage. At night, merely store the boxes at room temperature.

Make sure that if you bury and incubate your eggs in sand boxes, that sufficient holes are drilled to let out water from heavy rain. I prefer to merely incubate eggs in an open nest; that is, not in a container, no sides, no bottom. I feel that the supply of oxygen to the embryo is diminished by the sides of a box and that an undesirable moisture layer on the bottom cools the bottom layer of eggs, with poor results.

In you carefully open an egg with an embryo about 2 weeks developed, and being careful to remove it from the nest without turning it in any way, you will find the embryo uppermost and attached to the inner membrane. As the embryo develops, so does the delicate network of blood vessels spread until the whole yolk sac is encompassed. If you then turn the egg upside down, the weight of the yolk and albumin is then upon the embryo, and apart from the shaking and vibration of transportation rupturing these delicate blood vessels, the embryo can be smothered by the weight upon it.....

On June 30th the remaining eggs from Chidambaram were opened and no embryos were observed in any of them. Some were watery and foul smelling, some with normal albumin and yolk material and some had solidified cheesy material. It seems as though all these eggs were infertile. A number of fish have been dying in Chidambaram Waterworks. Since Endrin is used in the fields around the tanks, we are now investigating to find out if the use of pesticides is connected with the infertility of the eggs.

CHART SHOWING OPTIMUM INCUBATION TEMPERATURES FOR CROCODILIAN EGGS

SPECIES	OPTIMUM NEST TEMPERATURE	SOURCE
<i>C. porosus, C. siamensis</i>	95° F	Samut Prakan, Thailand
<i>C. niloticus</i>	82-93°	Pooley, South Africa
<i>A. mississippiensis</i>	80-85°	Chabreck, USA
<i>C. niloticus</i>	90-95°	Rhodesia Nat'l Parks
<i>C. niloticus</i>	90-95°	Modha, Africa
<i>C. porosus, C. johnsoni</i>	90°	Bustard, Australia
<i>C. palustris kimbula</i>	90°	Deriyanagala, Ceylon

TEMPERATURES RECORDED IN MADRAS SNAKE PARK HATCHERY DURING 1974 INCUBATION SEASON

23-5-1974 :

6 : 00 a.m.	82°F
8 : 00 a.m.	82°F
10 : 00 a.m.	84°F
12 noon	86°F
2 : 00 p.m.	90°F
4 : 00 p.m.	90°F
6 : 00 p.m.	87°F

6-5-1974 :

6 : 00 a.m.	80°F
8 : 00 a.m.	83°F
10 : 00 a.m.	88°F
12 noon	90°F
2 : 00 p.m.	94°F
4 : 00 p.m.	95°F
6 : 00 p.m.	92°F

29-5-1974 :

6 : 00 a.m.	85°F
8 : 00 a.m.	86°F
10 : 00 a.m.	89°F
12 : noon	92°F
2 : 00 p.m.	95°F
4 : 00 p.m.	94°F
6 : 00 p.m.	92°F

Temps. recorded at nest sites

	Surface (shade)	Nest cavity (40cms under ground)
Chidambaram :		
7 : 00 a.m.	86°F	90°F
7 : 00 p.m.	93°F	92°F
Sri Rangam :		
Midnight	81°F	88°F

Chart Showing Egg Sizes. (The Chidambaram clutch showed especially wide variation in sizes. Measurements were taken with Bernier calipers.)

Chidambaram :

	Diameter (cm)	Length (cm)		Diameter (cm)	Length (cm)
1)	3.1	6.1	18)	3.0	5.6
2)	3.7	8.1	19)	3.8	6.8
3)	3.8	7.6	20)	3.7	6.9
4)	4.2	8.9	21)	3.5	6.9
5)	3.8	7.1	22)	3.6	6.7
6)	3.7	7.3	23)	3.2	6.5
7)	3.8	7.6	24)	3.3	6.2
8)	3.8	7.7	25)	3.7	7.2
9)	3.8	6.0	26)	3.2	6.8
10)	3.6	7.0	27)	3.6	7.0
11)	3.8	6.8	28)	3.8	7.0
12)	3.7	7.2	29)	3.3	6.5
13)	4.3	8.9	30)	3.5	6.8
14)	3.7	6.9	31)	3.8	7.2
15)	3.6	6.9	32)	3.7	9.6
16)	3.7	6.7	33)	4.4	14.0
17)	3.8	7.2			(double egg)

Largest egg : 8.9×4.3 cm

Smallest egg : 5.6×3.9 cm

Average weight : 72 gms

Average shell thickness : 0.7 mm

Sri Rangam :

	Diameter (cm)	Length (cm)		Diameter (cm)	Length (cm)
1)	3.3	6.4	11)	3.5	6.6
2)	3.3	6.1	12)	3.4	6.0
3)	3.5	6.3	13)	3.5	6.2
4)	3.25	5.9	14)	3.4	6.4
5)	3.4	6.1	15)	3.3	6.0
6)	3.4	5.7	16)	3.3	6.2
7)	3.2	5.5	17)	3.3	6.0
8)	3.3	6.0	18)	3.4	6.0
9)	3.6	6.4	19)	3.3	6.0
10)	3.5	6.2	20)	3.4	6.1
			21)	3.3	6.2

Largest egg : 3.6×6.4 cm

Smallest egg : 3.2×5.5 cm

HATCHLING SIZES (MEASUREMENTS TAKEN TEN DAYS POST BIRTH)

	LENGTH	GIRTH	WEIGHT
1)	28.5 cm	10 cm	68 gm
2)	28.5 cm	9.0 cm	70 gm
3)	28.5 cm	10 cm	68 gm
4)	26 cm	9.0 cm	60 gm
5)	26 cm	9.0 cm	71 gm
6)	27 cm	9.0 cm	71 gm
7)	25.5 cm	9.0 cm	70 gm
8)	30.5 cm	10 cm	80 gm
9)	30.5 cm	10 cm	81 gm
10)	28.5 cm	9.5 cm	73 gm
11)	28.5 cm	9.5 cm	80 gm
12)	27.5 cm	9.5 cm	72 gm
13)	28.5 cm	9.75 cm	74 gm
14)	28.0 cm	9.0 cm	70 gm
15)	27.5 cm	9.0 cm	71 gm

Average :—

Length—28 cm

Girth—9.5 cm

Weight—67 gm

At the time of writing the juvenile crocodiles are thriving well in the hatchery. About half the enclosure is covered by a gravel bottomed pool, (25 cm water depth). It is well shaded and thick grass has been placed in it for the young to hide in. Most of the daylight hours are spent in the grass. Small frogs, chopped fish and a light bulb to attract insects are the feeding measures adopted.

APPENDIX

Sites in Southern India which still have at least small populations of *C. palustris* are listed below. It would be in the interests of ecology, tourism and the state economy in general for the Agriculture Departments, under which the Forest and Fisheries legislation is formed, to take an active interest in the propagation and encouragement of these very endangered reptiles, the crocodiles.

These locations were found by distribution of investigation proformas, interviews and correspondence. Surveys of each state should reveal other croc populations. Forest Department information includes only areas known to them, and under their jurisdiction (i.e. Reserve Forests and Sanctuaries).

Tamil Nadu

- 1) Mudumalai Wildlife Sanctuary, (Moyar River), Nilgiris.
- 2) Pechiparai Dam, Kanya Kumari District.
- 3) Amaravathi Dam, Coimbatore District
- 4) Mettūr Dam, Salem District.
- 5) Kilikudi Tank (via Kallani), Tiruchirapalli.
- 6) Vakkaramari Water Works, Chidambaram, Tanjore District.
- 7) Sathanur Dam, North Arcot District.
- 8) Seerianai Dam, Below Sathanur North Arcot District.
- 9) Village Tank 12 kms west of Coleroon Rly. Stn. on south bank.
- 10) Upper Dam, Kuraiar, Papanasam, Tirunelveli District.
- 11) Pillur Dam, (Bhavani River) Coimbatore District,
- 12) Bhavani Sagar Dam, Coimbatore District.

Kerala

- 1) Malampuzha Dam, Palghat District.
- 2) Neyyar Dam (Wildlife Sanctuary), Trivandrum District
- 3) Parambikulam (Wildlife Sanctuary)
- 4) Some temple tanks in Kozhikode and Palghat Districts

Karnataka

- 1) Ranganthitoo Bird Sanctuary, Mandya District (Cavery River)
- 2) Cauvery Falls, Mysore District
- 3) Dandeli Sanctuary, North Kanara District (Kalinadi River)
- 4) Tungabhadra Dam, Reservoir and River, Dharwar District
- 5) Mulehole Sanctuary, Mysore District (Nugu River)
- 6) Mekadertha, Kollegal Taluka (Cauvery River)
- 7) Hagari River, Mangalore, South Kanara District.

Andhra Pradesh

- 1) Sinhachalam, Godavari River, North Andhra
- 2) Pakhala Wildlife Sanctuary, Warangal District (Pakhal Lake)
- 3) Kundaram Reserve Forest, Mancherial Forest Division
- 4) Nizam Sagar Dam, Medak District (Manjira River)
- 5) Nagarjunasagar Dam, Nalgonda District (Krishna River)
- 6) Srisailem Project.

Other States

Maharashtra :

- 1) Borivli National Parks, Tulsi and Vihar Lakes, Bombay
- 2) Taroba National Park, Taroba Lake, Chandrapur District
- 3) Pench National Park, Pench River, Nagpur District
- 4) Maneyaon Range (Sawantwadi) Ratnagiri District
- 5) Kundalika River, Roha Forest Division, Kolaba District
- 6) Melghat Wildlife Sanctuary, Tapti River, Amravathi District.

APPENDIX II

COMMON FLORA AND FAUNA OF CHIDAMBARAM

Fish :—Tamil names

- 1. Gelabi
- 2. Vurrel
- 3. Ara
- 4. Koravay
- 5. Kelthi
- 6. Kola
- 7. Kula Kandey
- 8. Wogri Kandey
- 9. Valachey Kandey
- 10. Paneer Kandey
- 11. Valangi Kandey
- 12. Sorta vala
- 13. Theli

Frogs and Toads

ENGLISH	TAMIL	SCIENTIFIC
<input type="checkbox"/> 1. Skittering Frog	Sada tavalay	Rana cyanophlictis
<input type="checkbox"/> 2. Bullfrog	Peria tavalay	Rana tigrina
<input type="checkbox"/> 3. Green Frog	Pachai tavalay	Rana hexadactyla
<input type="checkbox"/> 4. Common tree frog	Teray	Rhacophorus maculatus
<input type="checkbox"/> 5. Common Toad	Surey tavalay	Bufo melanostictus
<input type="checkbox"/> 6. Paddy Frog	Keiney tavalay	Rana limnocharis
7. Red Microhyla	Siri Kattrai	Microhyla ornato rubra
8. Painted Frog	Periya kattrai	Kaloula pulchra taprobanica

Reptiles

Crocodylian

ENGLISH	TAMIL	SCIENTIFIC
1. Marsh crocodile	Mothalay ("The First")	Crocodylus palustris

Turtles

ENGLISH	TAMIL	SCIENTIFIC
<input type="checkbox"/> 1. Soft shell turtle	Nadaamai	Lissemys punctata
<input type="checkbox"/> 2. Common terrapin	Karuppu aamai	Geomyda trijuga

Lizards

ENGLISH	TAMIL	SCIENTIFIC
<input type="checkbox"/> 1. Common monitor	Udumbu	V. bengalensis
2. Garden lizard	Wona	Calotes versicolor
3. Common skink	Arranay	Mabuya carinatus
4. House gecko	Veedu palli	Hemidactylus brooki
5. Tree gecko	Marram palli	Hemidactylus leschenaulti

Snakes

ENGLISH	TAMIL	SCIENTIFIC
<input type="checkbox"/> 1. Rat snake	Sarai pambu	Ptyas mucosus
2. Banded Racer	Word-gali pambu	Argyrogena fasciolatus
3. Bronze back tree snake	Marram eri pambu	Dendrelaphis tristis
4. Vine snake	Pachai pambu	Ahaetulla nasutus
<input type="checkbox"/> 5. Checkered keelback	Tunni pambu	Xenochropis piscator
<input type="checkbox"/> 6. Olive keelback	Tunni pambu	Atretium schistosum
7. Wolf snake	Nai pambu	Lycodon aulicus
8. Kukri snake	Yena panian	Oligodon arnensis
9. Common sand boa	Munveli pambu	Eryx conicus
10. Striped keelback	Nikatan kutti pambu	Amphiesma stolatus
11. Cobra	Nulla pambu	Naja naja naja
12. Blind snake	Seer pambu	Typhlops braminus

Birds

- | | |
|--|------------------------|
| 1. White breasted kingfisher | 20. Oriole |
| 2. Pied kingfisher | 21. Tree pie |
| 3. Small kingfisher | 22. Magpie robin |
| 4. Roller | 23. Pied wagtail |
| 5. Pheasant tailed jacana | 24. Palm swift |
| 6. Pond heron | 25. Weaver bird |
| <input type="checkbox"/> 7. Cattle egrets | 26. Spotted dove |
| 8. Yellow wattled lapwing | 27. Grey partridge |
| 9. Coot | 28. Rose ring parakeet |
| 10. Grebe | 29. Common minah |
| <input type="checkbox"/> 11. Cotton teal | 30. Brahminy minah |
| 12. Water-hen | 31. Crow |
| 13. Green bittern | 32. Jungle Crow |
| <input type="checkbox"/> 14. Common kite | 33. Spotted owl |
| <input type="checkbox"/> 15. Brahminy kite | 34. Drongo |
| 16. Black-winged kite | 35. Babbler |
| 17. Crested cuckoo | 36. Flower pecker |
| 18. Koel | 37. Sun-bird |
| 19. Golden-backed woodpecker | 38. Shikra |

Mammals

ENGLISH	TAMIL	SCIENTIFIC
<input type="checkbox"/> 1. Jackal	Nurri	Canis aureus
<input type="checkbox"/> 2. Mongoose	Keeri pillay	Herpestes edwardsi
3. Small Indian Civet	Puniku poonai	Viverricula indicatus
4. Palm civet	Murranai	Paradoxurus hermaphrodi
<input type="checkbox"/> 5. Jungle cat	Kattu poonai	Felis chausu
6. Palm squirrel	Anil	Funambulbs palmarum
7. Rice rat (mole rat)	Keini yeli	Bandicota engalensis
8. Field mouse	Soond yeli	Mus booduga
9. Shrew	Moonj yeli	Suncus murinus

Other fauna :

ENGLISH	TAMIL
<input type="checkbox"/> 1. Crabs	Nandu
<input type="checkbox"/> 2. Snails	Nathai
<input type="checkbox"/> 3. Crayfish	Yerra
4. Mussels	Muttee
5. Leeches	Attai
6. Lots of insect life and aquatic beetles. Coleoptera and dragon flies (Odonata) well represented.	

Livestock : Dog, goat, cattle, water buffalo, pig, duck, chicken.

Cultivation : Rice, castor, plantain, pulses, peanuts.

Soil : Black, clayey, sticky when damp.

Temperatures : (15—2—'74)

Ground in shade :

6 : 00 a. m.—66°F

12 noon —85°F

6 : 00 p.m. —82°F

12 midnight—70°F

Water : 6 : 00 a. m.

Surface — 76°F

1 ft. under 78°F

Bottom — 80°F

Canal 78°F

Average yearly rainfall : 90cm

Location : 16 kms inland of Bay of Bengal

NOTE : = probable crocodile food items

= possible predators on eggs and young crocs.

TREES AND PLANTS

ENGLISH	TAMIL	SCIENTIFIC
1. Coconut	Thenna marram	Cocus nucifera
2. Rain tree	Thungu munji marram	Samanea saman
3. Tamarind	Pulliya marram	Tamarindus indica
4. Neem	Vepe marram	Azadirachta indica
5. White Thorn	Vel marram	Acacia leuophloea
6. Wood apple	Vila marram	Feronia elephantum
7. Peepul	Arasu marram	Ficus religiosa
8. Tree	Vunni marram	
9. Tree	Vela pilangi marram	
10. Stinging nettle	Poonai kanjam kodi	Tragia involucrata
11. Shrub	Vela katamani	Jatropha gossypifolia
12. Shrub	Gaya poondu	
13. Jungle lady fingers	Kattu vendai	Hibiscus ficulneus
14. Shrub	Chittra molam	
15. Shrub	Adu tinnapal	Aristolochia brachteata
16. Vine	Neer sorpan kodi	
17. Vine	Kovai kodi	Coccinia indica
18. Vine	Ooppli kodi	Leptadenia reticulata
19. Vine	Peru wotrai kodi	
20. Vine	Nareli kodi	
21. Penny-wort	Vallai kodi	Centella asiatica
22. Vine	Musumusingu kodi	
23. Shrub	Sangam cheddi	
24. Winter cherry	Amakara cheddi	Withania somnifera
25. Country mallow	Thuthi cheddi	Abutilon indicum
26. Shrub	Wotrai cheddi	
27. Castor	Amanak cheddi	Ricinus communis
28. Indian jujube	Yellandan marram	Zizyphus jujuba
29. Shrub	Karruppu pilangi	
30. Grass	Souri	Echinochlea colona
31. Water grass	Nannal	
32. Nut grass	Korai	Cyperus rotundus
33. Water grass	Jambu	Typha angustata
34. Tall grass	Durbai	Imperata arundinacea
35. Milk weed	Yerukku	Calotropis gigantea
36. Basil	Kattu thulasi	Ocimum canum
37. Wild date	Ichcham marram	Pheonix sylvestris

Water weeds :

1. Water weed	Velampasi	Hydrilla verticillata
2. Tape grass	Kuthiraivalempasi	Vallisneria spiralis
3. Algae - various species.		

Note : This is the list of only the more common wildlife of the Chidambaram Waterworks.

Conservation of Crocodiles

Crocodiles all over the world have been persecuted for being predators and for having valuable skins. Now that the study of ecology is advancing fast we realize that predators are not destructive but absolutely necessary for a healthy environment. It may be hard to like a crocodile at first sight but a little knowledge and association with them will convince one of their fascination and usefulness. The danger of crocs is greatly over-rated, as any villager in "croc country" will affirm.

Reasons for Conservation of Crocodiles :

1. **Tourism** ; African countries are realizing the value of their wildlife for tourism. Many tourist dollars are spent visiting such crocodile spots as Murchison Falls and Ndumu in Natal. Already we see Ranganthitoo Bird Sanctuary in Karnataka and Ranthambor Wildlife Sanctuary in Rajasthan becoming very popular places and a part of the attraction is certainly the huge aquatic reptiles basking on the rocks. Each state has several dams, sanctuaries and other sites suitable for crocodiles which could attract tourists.
2. **Commercial value** : The number of crocodiles in India has declined to the point of near extinction but it is not too late for them to recoup. The crocodile expert from FAO, Dr. H.R. Bustard, who recently visited India is confident that if each state took an interest and invested in the future of crocodilians, cropping for skins would eventually bring a tremendous revenue to the state. This policy of continued "farming" of wildlife rather than the senseless "mining" activities of the past and present will ensure the survival of species because their commercial value can be fully realized without depleting the populations. Killing crocs is illegal in India but the skin value, Rs. 15-20 per inch (width of belly skin) is such that poaching and smuggling is squeezing the last few animals that exist. What could be a valuable national asset is being destroyed by a few greedy individuals.
3. **Ecological value** : Crocodiles serve as important predator/scavengers in their water and swamp environments. Without them diseased and crippled fish are not cleared up and predatory fish, on which crocs feed, kill all the fry of commercially valuable fish. In the U.S. it was noted that an over abundance of the dangerous Eastern Diamond back Rattlesnake may have been due to a decrease in alligators, as they both feed on rodents and rabbits. It is a well established fact that an increase in food causes an increase in the reproductive potential in animals such as snakes. It seems likely that high snake populations in rice growing areas would be some what reduced if the other natural rodent predators, crocodiles, were allowed to live in adjoining tanks and rivers. Crocodiles are also a good protection for birds' eggs as they eat climbing predators like monitor lizards which feed on the eggs whenever they get the chance. Another "charity act" of crocodiles is making water holes in the dry season, thus making it possible for fish and other animals to survive the heat too. In short, crocodiles like every other animal have very definite duties to perform in the cycle of nature; and when they are wiped out from an area the ecological balance is upset, as there is no one else to do their work!
Even the fact that they have been around 100 million years longer than we have is a good reason for saving them.

Methods of Conservation :

1. Educating the public about the ecological necessity of the continued survival of crocodiles, that they are a valuable resource, that fishing depletes with the loss of crocodiles.
2. Surveys and studies of wild populations in view of No. 3.
3. Setting up preserves, semi-captive and captive breeding projects with co-operation of State and Central Governments.
4. Official and strict implementation of laws like the '72 Wildlife Protection Act which gives complete protection to Indian crocodiles.
5. Capture and removal of crocodiles still existing in populated areas and therefore likely to be killed, to protected areas.

Sample notes for one day

Proforma for Crocodilian Study

Date : 18th July 1973

Place : Chidambaram Municipal Water works, Tamil Nadu, India.

Tank Name : Vakkaramari Water works (Low)

Average width : 350 feet Length : 1650 feet

Depth when full : 11 feet Depth at present : 3 feet

Weather Conditions : Average temp. (C) 38 Average Humidity : 75%

Cloudy

Vegetation : Moderate tall grass bordering tanks Soil Type : Mud

State of Water : Clear (North tank clear, South tank weed choked and full of algae.)

Periods of Observation : 1. 4-30—6-30 p.m. 2. 8-30—9-30 p.m.

Observations : (Walking on bund)

South Tank :

Two 4' crocs basking completely out on top of weeds in tank center.

One 8' croc, head and back visible.

Two 3' crocs, head and tail visible, floating on algae.

One 4' croc lunged away and into water at 50 yards distance.

One 6' croc basking completely out on bank.

One large croc dove into water 10 yards ahead of us.

One small croc quietly submerged in front of us.

Observation in Detail :

Slight breeze. Hot sun and clouds. Many water birds : Jacana (mating), grebe, cotton teal and pond herons.

We saw nest site (eggs hatched early July) about 30 cms. diameter and 50 cms. deep. Remains (shells) of about 15 eggs. Average egg size 5.5 cm x 8.0 cm. Nest site 8 feet above waterline on South-facing bund.

8-30 p.m.—9-30 p.m. We observed seven crocs in South Tank one in North Tank by eye reflection with spotlight. It is noted that frog and fish population is very dense.

Proceedings Of The Chief Conservator Of Forests, Madras-6.

Present : K. A. BHOJA SHETTY, I.F.S.

D.Dis. 3825/74 W2

Dated 4-4-1974

Sub: WILD LIFE—Crocodiles—Collection of Crocodile
eggs for hatching—Permission—Granted,

Ref: From Mr. Romulus Whitaker, Madras Snake
Park Trust, Madras letter dated 18-2-1974.

Permission is hereby granted to Thiru Romulus Whitaker, Madras Snake Park Trust, Madras for the collection of crocodile eggs found at Crocodile nesting sites in Tamil Nadu for artificial hatching and release of 25% of hatched crocodiles in suitable places. This permission will be valid upto 31-3-1975 from the date of this order.

2. Thiru Whitaker is requested to send a quarterly report showing the following details:

- a) Number of eggs collected
- b) Date of collection
- c) Place from where collected
- d) Number of young ones hatched
- e) Number of young ones released after rearing in captivity

for CHIEF CONSERVATOR OF FORESTS,

To

Mr. ROMULUS WHITAKER, Madras Snake Park Trust, Madras-22.

Copy to Conservators of Forests, Madurai, Tiruchirapalli,
Coimbatore and Madurai Circles.

Copy to Stock file.

COPY

GOVERNMENT OF TAMILNADU ABSTRACT

Wild Life—Crocodiles—Keeping crocodiles for Conservation purposes.
Permission to Mr. Romulus Whitaker, Director Madras Snake Park Trust
Guindy—Granted.

FOREST AND FISHERIES DEPARTMENT

G. O. Ms. No. 219

Dated, 19th November 1973

Read:—

From the Chief Conservator of Forests, Letter No. 6107/73.

W2, Dated 20-7-73, 7-9-73 and 1-11-73.

ORDER:—

The Government permit Mr. Romulus Whitaker, Director, Madras Snake Park Trust, Guindy, to keep 30 (thirty) adult crocodiles and 100 (one hundred) young crocodiles, for the purposes of rearing, scientific study and exhibition only.

2. The permission granted in paragraph 1 above is subject to the following conditions:—

1) Mr. Whitaker should abide by the provisions laid down in the Wild Life (protection) Act, 1972 and the rules framed thereunder, when the Act comes into force in this state.

2) The crocodiles kept should be for conservation purpose only and no trade or other commercial dealings should be undertaken under this permission.

3) A quarterly return should be submitted by Mr. Witaker to the Chief Conservator of Forests in the following form:

<i>No. of crocodiles acquired at the commencement of the farm.</i>	<i>No. added (i.e. by breeding, etc) during the quarter.</i>	<i>No. disposed of (i.e. by death etc.) and the nature of disposal.</i>	<i>Total at the end of the quarter.</i>
(1)	(2)	(3)	(4)

4) He should allow the officers authorised by the Chief Conservator of Forests, to inspect the crocodiles and should also furnish required information called for by the Forest Department.

5) Reserch papers driven from running the crocodile farm should be furnished to the Chief Conservator of forests free of cost.

(BY ORDER OF THE GOVERNOR)

K. CHOCKALINGAM,
Special Secretary to Government.

To

The Chief of Conservator of Forests, Madras-6.

Copy to : Mr. Romulus Whitaker,
Director, Madras Snake Park Trust and Conservation Centre,
Guindy, Madras-600022.

Copy to : The Director, Wild Life Preservation, Ministry of Agriculture,
(Department of Agriculture) Government of India, New Delhi.

(Forwarded/by order)

Section Officer.

(COPY)

Acknowledgements

Thanks is extended to the Chief Conservators of Forests and other officials of the Forest Departments in the states concerned for their help in making this study possible. We are specially grateful to the CCF and Wildlife Officers, Tamil Nadu for their kind cooperation Mr. Vijayaraghavan and the Municipal Commissioner, Chidambaram, extended warm hospitality and help during our study there. C. A. Ross, National Museum, Washington D.C., Dr. H.R. Bustard of FAO, and Tony Pooley of Ndumu, Zululand gave valuable advice and comments during the course of this study.

The Madras Snake Park staff is to be commended for their enthusiasm and participation in all aspects of this work. Lastly, I am grateful to my wife Zahida for compiling and typing this report.

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World Wildlife - India.

A MADRAS SNAKE PARK TRUST PUBLICATION.



Marsh Crocodile nest containing 33 eggs.
The nest hole was dug in the black earth embankment of a tank bund.



View of the South Tank at Vakkaramari,
Chidambaram showing the nesting embankment in the foreground.