

The distribution, abundance and threat of the  
saltwater crocodile, *Crocodylus porosus*, in the  
Bentota Ganga, Sri Lanka

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## Introduction

*Crocodylus porosus* is considered by a number of authors as the largest recent crocodile species (e.g. DERANIYAGALA 1936, DANIEL 1983, GROOMBRIDGE 1987, Steel 1989), whereas the latter author and previously BELLAIRS (1969) discussed data of specimens with exaggerated lengths. On the average adults have a total length of 3.50 – 4.50 m (BRAZAITES 1974). Undisputedly there is a possible danger for humans by adult *C. porosus* (POOLEY & ROSS 1989, NEIL 1971). DERANIYAGALA (1930) described the body measurements of a saltwater crocodile from Bentota as those belonging to a “man-eater”. In 1955 he described the non-valid subspecies *C. p. minikanna* with the Sinhalese meaning of man-eater. However, already in 1930 DERANIYAGALA noted that the species has become rare on Sri Lanka and in 1979 WHITAKER & WHITAKER stated that *C. porosus* needs a nature reserve if the species shall survive on the island – and this will work only when there is an adequate protection of their habitats. Previously WHITAKER & WHITAKER (1977) emphasized that the Sri Lankan government should establish a sanctuary for the species in which the crocodiles are protected and can live without conflicts with humans. GROOMBRIDGE (1982) reported that beside commercial hunting, which was carried out mainly in the 1950s and 1960s the species is mainly threatened by loss of habitat and this is also mentioned by BUSTARD (1971) and DANIEL (1983) for instance. Actually in the most important region in the southwestern part of Sri Lanka not even one protected area exists for *C. porosus*. One cause for this was explained by STEEL (1989) who noted that crocodilians only have a very small popularity regarding their protection and are solely seen as a dangerous monster. In fact the species is nominally protected by legislation in Sri Lanka for many years (Appendix I of CITES, 5<sup>th</sup> amendment 1964 of the Fauna and Flora Protection Act [Amend. No. 44 of 1964], total protection by the 7<sup>th</sup> amendment to the Act [Amend. No. 49 of 1993], etc. However, the statement of GROOMBRIDGE (1987), whereas this way of protection by laws is mostly ineffectual is also the case on the island. According to WHITAKER (2004a) *C. porosus* has just “paper protection” in India and Sri Lanka and he considers it unlikely that the species is able to survive there. SENANAYAKE (1995) reported that crocodiles are killed at Sri Lanka in fear of attacks to man and life stock but also because of their meat. Also SANTIAPILLAI & WIJAYAMOHAN (2004) emphasized the existing bad image of crocodiles at Sri

Lanka. Looking ahead 30 years ago WHITAKER & WHITAKER (1977) proposed that beside conservation measures, also public awareness for the crocodiles should be carried out.

Definitely the numbers of crocodiles in the Bentota Ganga have been diminishing for many decades. This is noted by some older local people. Possibly a more generally unnoticed slowly disappearance of the crocodiles from some areas are welcomed by local authorities because of their potential negative impact on infrastructural development and tourism. Up to the 1970s crocodiles were still rather frequently present in the estuary of the Bentota Ganga and on both banks, which are cultivated today, the same thick vegetation as in other parts of the river existed. As in India the survival of the species in the future is very much depending on the preservation of mangrove habitats (BUSTARD & CHOUDHURI 1980). From the estuary the crocodiles have completely disappeared – partly because of the completely rendered unsuitable banks to house building, intense hunting in the past and current use by diverse tourist activities (GRAMENTZ 2008a).

The same accounts for parts on the coast. As was reported to me (GRAMENTZ 2008a) “for ages” no crocodiles were observed in the sea (Indian Ocean) in front of the mouth of the Bentota Ganga. That they were once present along the West coast of Sri Lanka was reported by DERANIYAGALA (1930) who mentioned that in the two years prior to his publication several specimens of 2 – 3 m length were captured off Kalutara, Panadura and Moratuwa (about 17.5 – 41 km north of Bentota). One should keep in mind that the major part of the *C. porosus* habitats – tidal rivers – are entered by them from the sea. It is virtually impossible for the crocodiles to reach different bodies of water by walking over land due to settlements and infrastructure in southwestern Sri Lanka. No matter how good the conditions in upper river parts may be, an immigration or emigration is likely to be very much reduced or even impossible when the habitat at lower river parts is largely destroyed. According to DERANIYAGALA (1936) the species inhabits no inland bodies of water at Sri Lanka. This leads more and more to an isolated subpopulation with diminishing numbers due to hunting of large specimens which have retreated to other parts of the river.

WHITAKER & WHITAKER (1979) suggested to carry out a census for the species and its distribution and in 2004 (b) WHITAKER urged again that this should be done. Therefore a study was carried out to identify current and potentially threatening processes and evaluate their impact on the crocodiles inhabiting the Bentota Ganga system. After a preliminary publication (GRAMENTZ 2008a) this report is intended to give a more thorough overview of the status of *C. porosus*

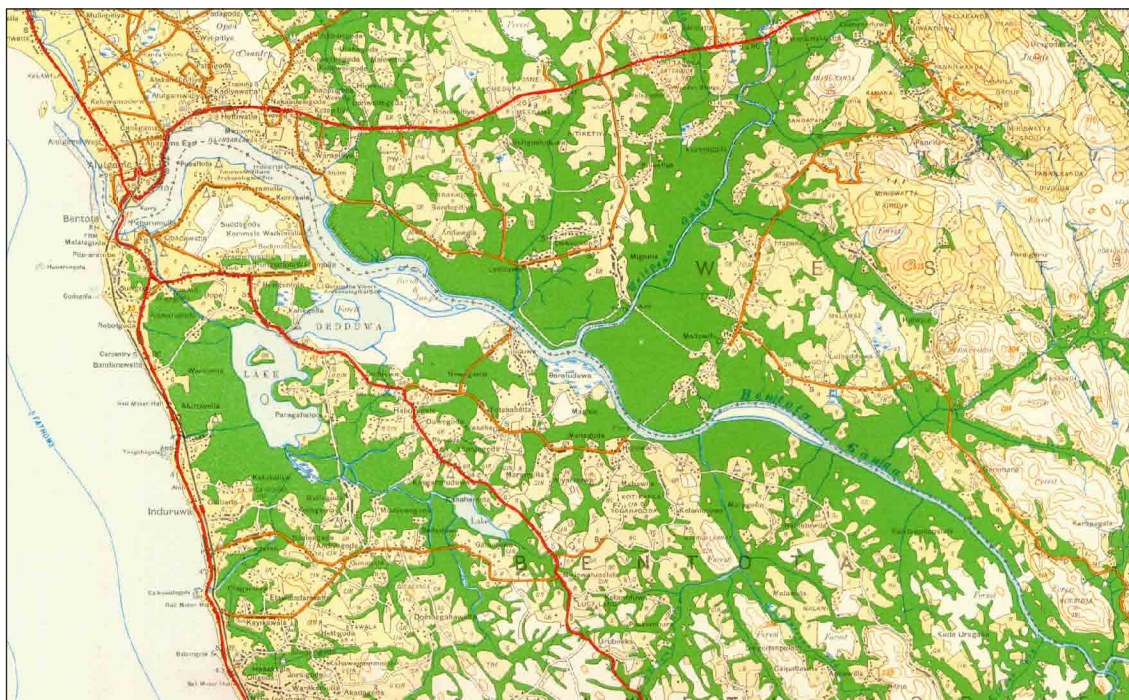


Fig. 1: Topographic map of the region of the Bentota Ganga with its tributaries and lakes.

From top to bottom  
 Fig. 2: Distribution of sighted adults of *Crocodylus porosus*.  
 Fig. 3: Relationship of sightings of immature and adult *Crocodylus porosus*. A – including recent hatchlings, B – without recent hatchlings.  
 Fig. 4: Population structure according to sightings of *Crocodylus porosus* in the Bentota Ganga and Welipenne Ganga.

in the Bentota Ganga and adjacent rivers and creeks. Still, for example, information on nesting success, survivorship, movements and food are lacking from that area.

### Study area

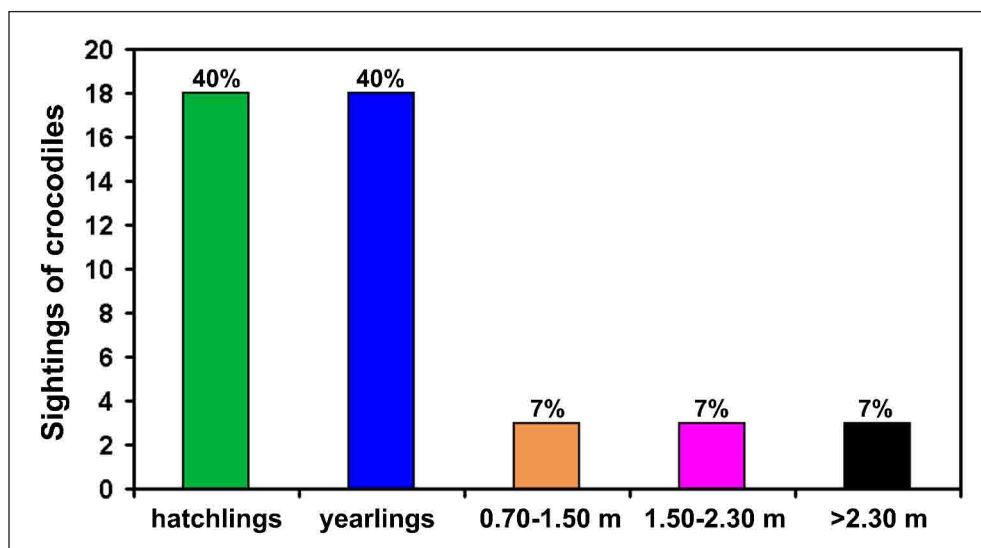
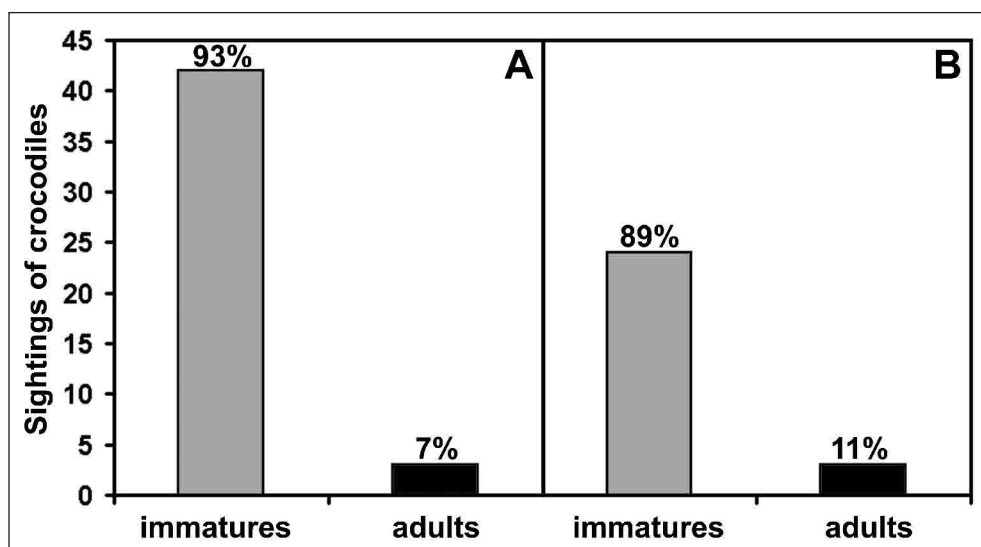
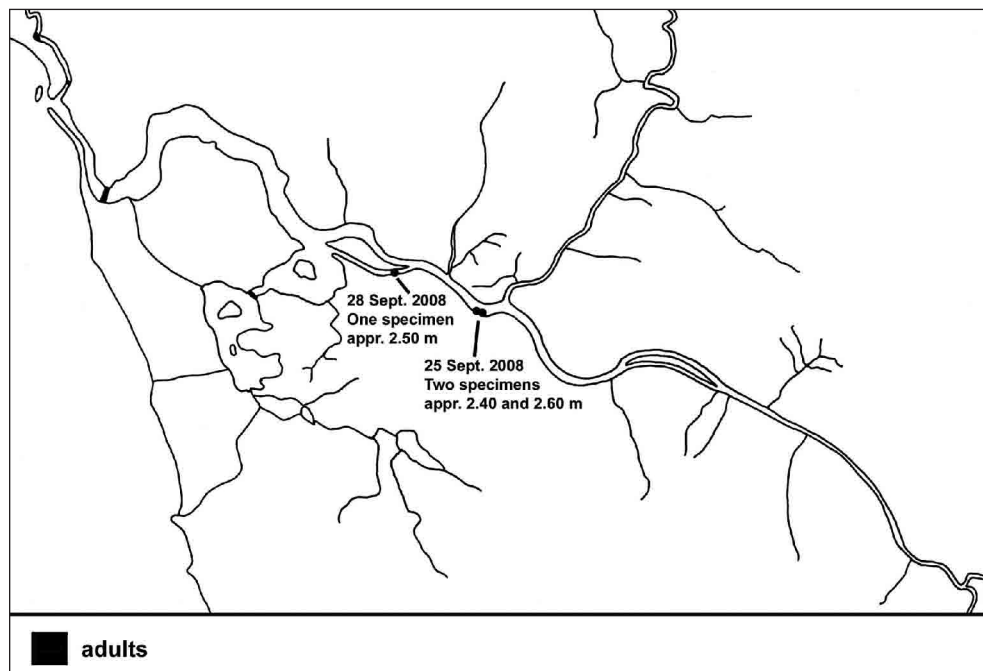
The Bentota Ganga has a length of about 55 km and its tributaries are predominantly the Welipenne Ganga, Pitugal Ganga, Pelawatta Ganga, Elpithiya Ela and Migaspithiya Ela. Beside these rivers the Kaluwamodera Ganga enters the Bentota Ganga close to its mouth. The Bentota Ganga and its tributaries are situated almost completely in the lowland wet zone of southwestern Sri Lanka. The original bank area of the river is dominated by mangroves.

### Material and Methods

The data presented here are partly based on a preliminary survey carried out from 23 to 26 November 2007 (day counts at these two days) (GRAMENTZ 2008a) and a more comprehensive one carried out from 24 September to 9 October 2008 (four day and four night counts from 29 September until 9 October). The third night count had to be stopped after about 60 min due to engine problems. It was tried to time the counts with the dark phases of the lunar cycle as well as falling tides (what was only partly possible at the end of the survey). On each survey large areas of the Bentota Ganga were searched, one day time survey included the Kaluwamodera Ganga and in two day time surveys the Welipenne Ganga. Total search time was 37 hrs 55 min (23 hrs 5 min during the day, 14 hrs 50 min during the night).

All night counts could only be carried out up to a maximum turning point for safety reasons as groups of illegal alcohol (Arrack) producers were active along the river. So unfortunately night counts from upper parts of the Bentota Ganga are still lacking.

It was hoped to find some concentrations of recent hatchlings to limit the area which is still used and suitable for nests. According to DERANIYAGALA (1939) the peak of the nesting season along the coast of Sri Lanka is July and August and the hatchlings of this report are those very recently hatched.



Although it is a common practise not to include hatchlings in calculations of relative abundance because of their high rate of natural mortality they were included here in some calculations for comparison to other non-hatchling size classes. Sizes of the crocodiles were estimated at closest range. Only three recent hatchlings were measured and released after a few



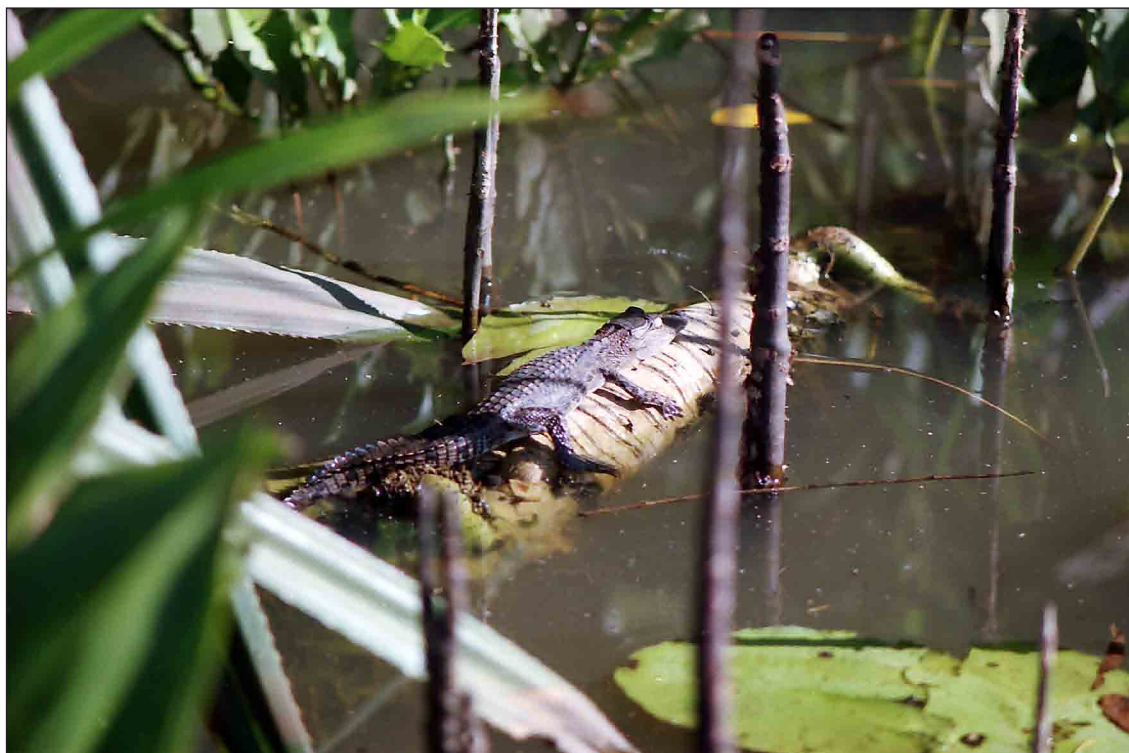


Fig. 5: Recent hatchling of *Crocodylus porosus* perched on floating vegetation (Bentota Ganga).

minutes at precisely the same spot. Crocodiles up to 35 cm total length were treated as recent hatchlings and specimens up to 70 cm as yearlings. Other immature size classes were 0.70 – 1.50 m and 1.50 – 2.30 m. Crocodiles were counted as adults when their size was estimated from 2.30 m onwards. ‘Eyes only’ counts were treated as non-hatchlings (yearlings approx. > 70 cm total length onwards). The crocodiles were counted from an outboard-powered boat with 15 hp engine at a cruising speed of about 3.1 to 3.6 miles/hour. During night counts the open water and the river banks were scanned by two persons with powerful torches. Once a crocodile was sighted its position was recorded using a GPS Garmin Geko 201 and approached so much so that it was possible to estimate its size. Size estimates as total length were made by two observers. In those instances (during night counts) where size estimates could not

flank/body side was found to be identical.

#### Survey results and discussion

According to WEBB & MANOLIS (1989) females reach maturity usually at a total length of 2.30 m. Therefore all crocodiles from that size onwards were considered being adults. However, only very few adults were observed ( $n = 3$ ). Date, estimated size and position of these specimens are given in figure 2.

The very few observations have probably two major causes. Illegal poaching over many decades of large individuals has surely depleted the local population to only a small number of remaining adults. In consequence these crocodiles have “developed” an extreme wariness and are therefore difficult to see and even more difficult to approach. WEBB & MESSEL (1978) discussed that when, for example a spear may be discharged with a resulting high proportion of wounded and disturbed crocodiles, they become wary. And furthermore where this interaction is regular, such learned wariness would be reinforced. Since nests have been produced in both years it is likely that there are still more adults living in the area than were observed. Nevertheless only in small numbers. As BAYLISS et al. (1986) noted, “there may be crocodiles,



Fig. 6: Yearling of *Crocodylus porosus* basking (Bentota Ganga).



Fig. 7: *Crocodylus porosus* of about 1.10 m total length (Welipenne Ganga).

especially larger ones, which are never seen". But also younger crocodiles might be difficult to see in populations under hunting pressure. BUSTARD (1968) reported very rapid learning even in immature *C. porosus* to avoid approaching boats.

The two adults of estimated 2.40 m and 2.60 m (fig. 2 and 9) could be observed and approached to about 50 – 60 m. At closer range they dived and reappeared on the surface a few minutes later having increased the distance to the boat under water again. However wariness in the crocodiles at open water was different to those where they could use the bank vegetation for concealment. The specimen in figure 8 (approximately 2.00 m in total length) could be approached to about 4 - 5 m. According to MESSEL (1977) the approach distance gives an indication of the hunting history of the area. In case the crocodiles have been or are hunted they become wary and have a long approach distance.

The percentage of sighted adults accounted only for 7% when recent hatchlings are included and 11% without hatchlings (fig. 3). Both recent hatchlings and yearlings represented 40% of the sighted crocodiles. The other two immature size categories as well as adults were represented in 7% of the sightings (fig. 3). Altogether 93% of the counted crocodiles were immatures and only 7% were adults. According to COTT (1961) and GRAHAM (1968) in an environment unaffected by human influences a normal crocodile population should be dominated by adults and juveniles should be represented in comparatively low numbers. However, the population in the area of the Bentota Ganga is strongly skewed towards hatchlings and yearlings. In Arnhem Land, Northern Australia, MESSEL (1977)

reported that hatchlings accounted for 23.22% of *C. porosus* seen and 23.06% were one year old.

I do not believe that the distribution presented in figure 4 reflects the actual proportion of crocodiles in the different size classes. Instead I suppose that all but hatchlings and yearlings are biased from the behaviour of the crocodiles. Frankly, it seems possible that crocodiles from the age of about one year onwards develop a high degree of wariness. Probably because of the above mentioned causes.

The first hatchling which was caught was still busy swallowing a large shrimp.

MESSEL (1977), WEBB (1977a) and WEBB et al. (1977) reported an average egg number of 50.3 (range 40-62, n = 18 nests) in

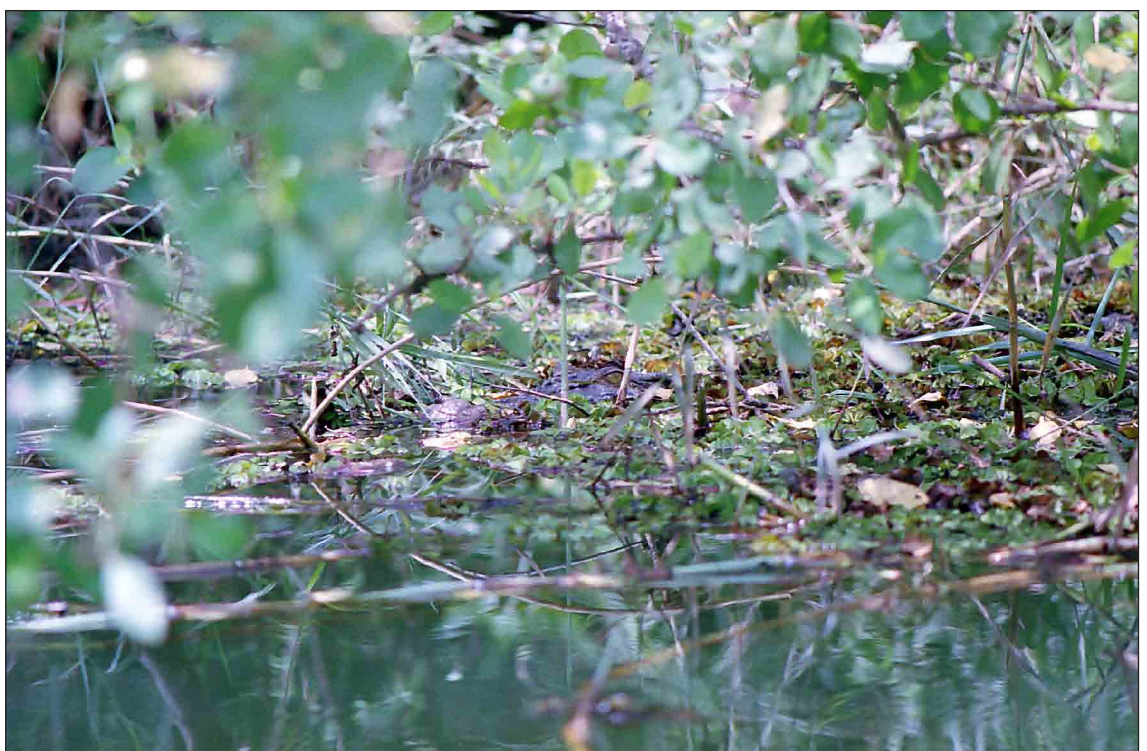


Fig. 8: *Crocodylus porosus* of about 2.00 m total length concealed in floating vegetation (Welipenne Ganga).



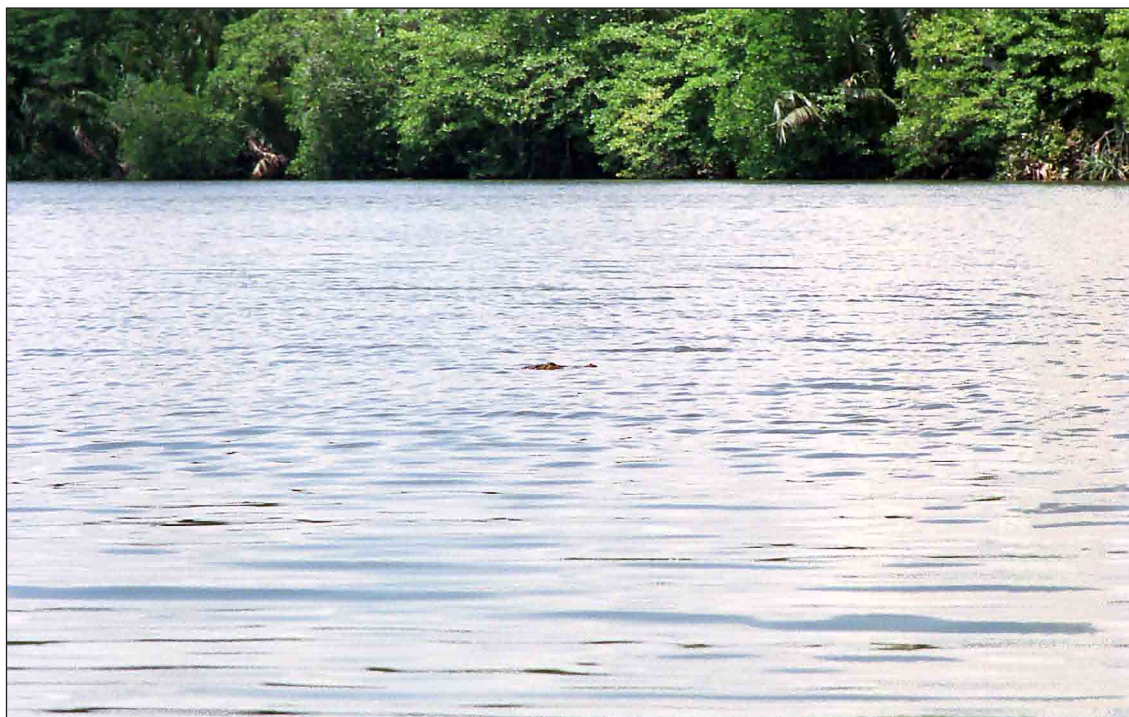


Fig. 9: Adult *Crocodylus porosus* of about 2.60 m (Bentota Ganga).

*C. porosus* nests. Therefore it is possible that even with relatively high mortality during incubation and shortly after hatch all hatchlings sighted and reported here came from just one and probably not more than two nests. This is also supported by the small number of reproducing adults and of what is known of the behaviour of the hatchlings. WEBB (1977b) reported a strong site fidelity in *C. porosus* hatchlings for the first time

remained unnoticed (especially when it would be guarded by a female). I rather assume, also because of the scattering pattern shown in figure 10 B, that the hatchlings are from one nest laid on an island. According to WEBB (1977a) hatchling groups stay together for up to  $2\frac{1}{2}$  months after hatching.

In the next size category (30-50 cm SVL, 1-2 years) considerably more downstream movement was found by WEBB (1977b) and therefore the yearlings in figure 11 show a greater dispersion. However, the number of nests (season 2007) must have been also very few (possibly also only one or two).

The sighted crocodiles of about 0.70 – 2.30 m are summarized in figure 12.

In older literature, which was also summarized by DERANIYAGALA (1939), total sizes of Sri Lankan *C. porosus* were reported as 5.25 m ( $17\frac{1}{2}$  feet) and 6.60 m (22 feet). The size structure must have been completely different to the situation today. This accounts also for their abundance. KARUNATHILA ka

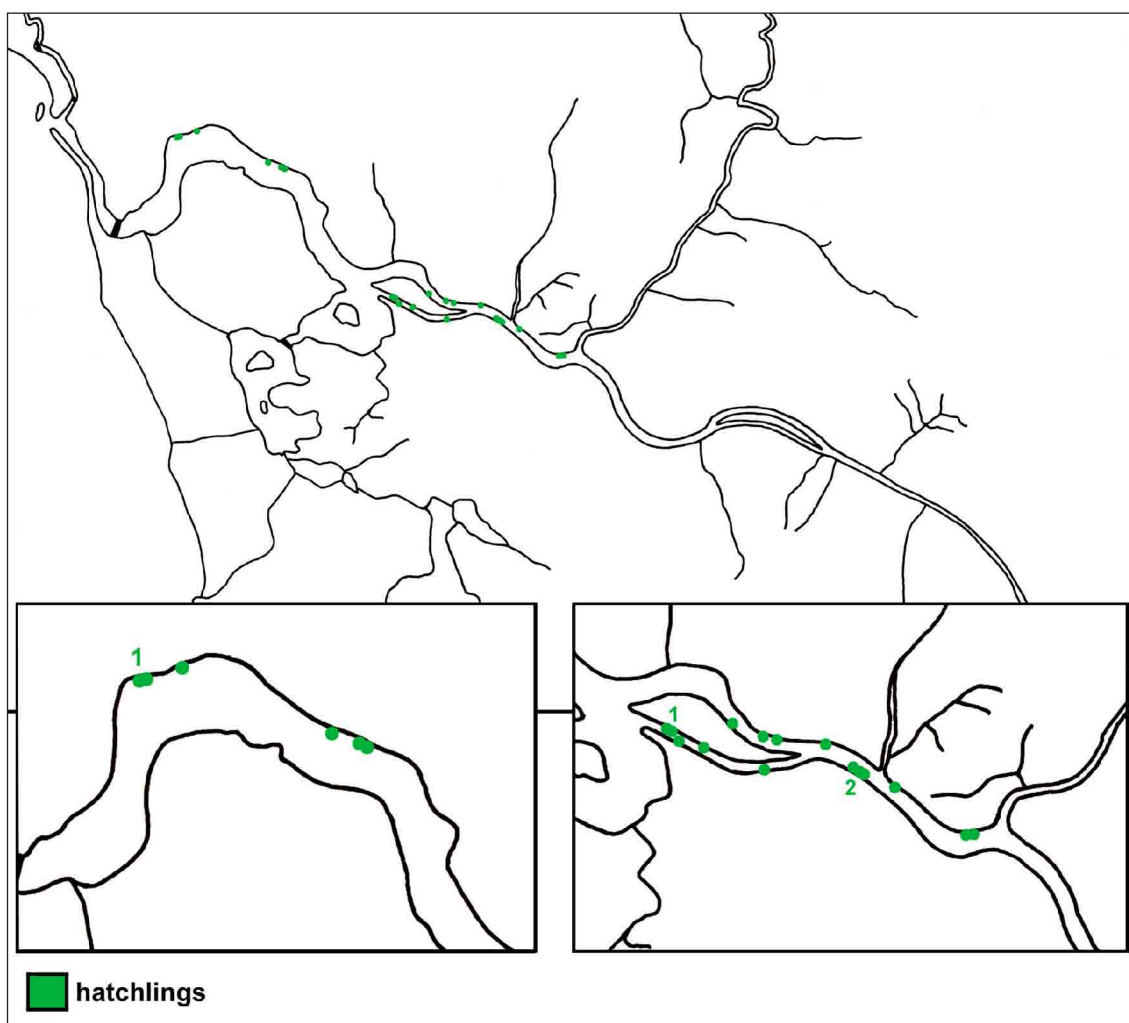


Fig. 10: Distribution of sighted recent hatchlings of *Crocodylus porosus*.

From top to bottom:  
 Fig. 11: Distribution of sighted yearlings of *Crocodylus porosus*.  
 Fig. 12: Distribution of sighted *Crocodylus porosus* of the size classes 0.70 – 1.50 m and 1.50 – 2.30 m.  
 Fig. 13: Distribution of 'Eyes Only' counts.

(1991) gives an indication on how numerous the crocodiles once were in the Bentota Ganga. He mentioned that when one balsa wood fruit fell into the water about seven crocodiles could be attracted to it coming to the water surface close to it.

### 'Eyes only' counts

Multiple 'eyes only' counts at the same location during different night surveys are assumed to represent the same specimens. Therefore, the 25 EO counts most probably represent a maximum of 17 individuals (fig. 13). Furthermore due to the habitat structure in which 'eyes only' counts occurred all were probably from immature crocodiles.

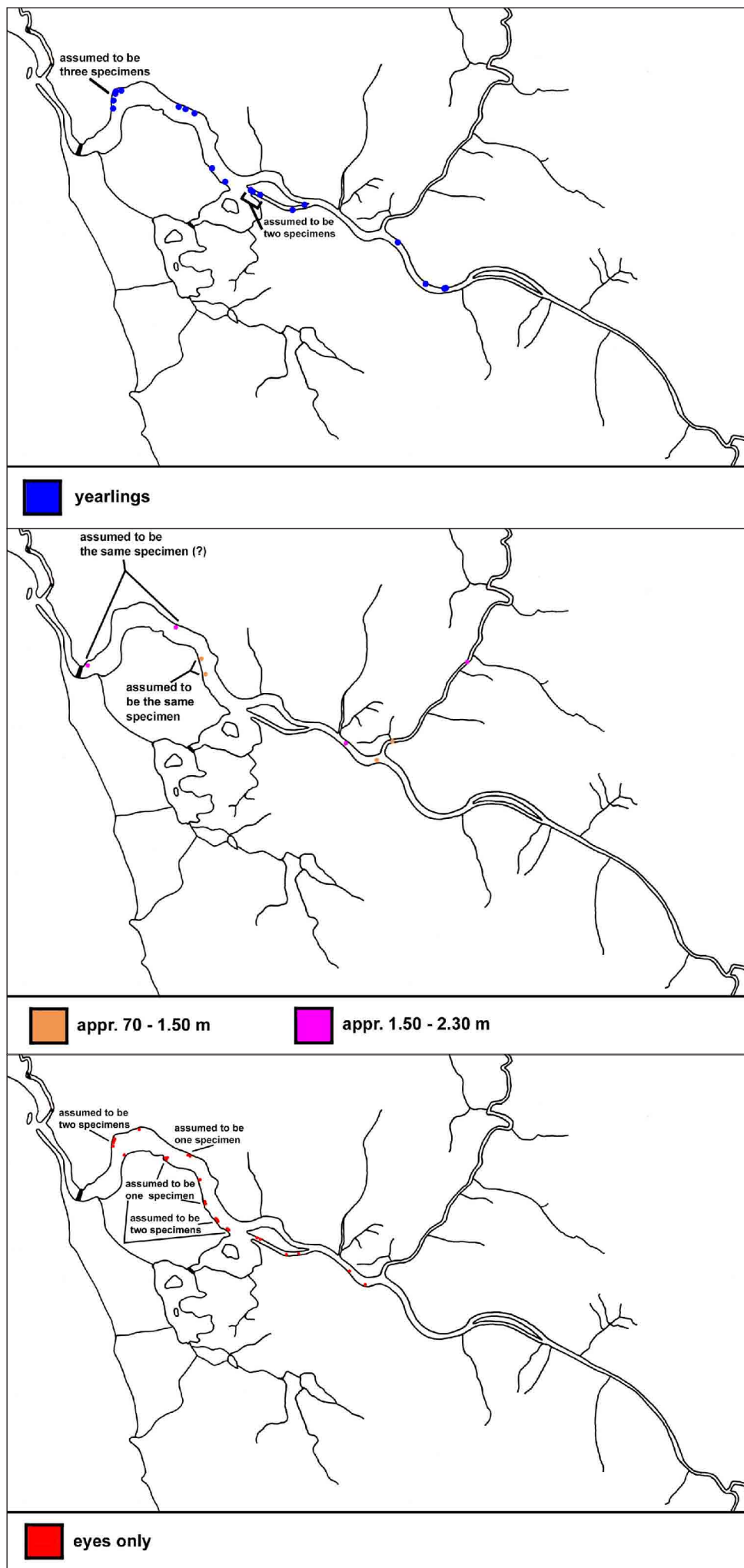
Of a number of crocodiles belonging to different size classes their association to the bank structure was noted (counts represent sightings and not individuals). As can be seen in figure 14 A most hatchling sightings were found in close association with mangrove habitats. This association is slightly reduced in yearlings (fig. 14 B), but this type of bank structure is clearly of major importance in these size classes. The presence of hatchlings during day and night in the water amongst mangroves and sometimes perched on small branches was previously documented and reported by WEBB (1977a). So some aspects of hatchling behaviour at Sri Lanka were the same as at Arnhem Land, Northern Australia.

### Threats and disturbances

#### Habitat loss

There is not much information available from which the former distribution and abundance of *C. porosus* at Sri Lanka in general and the Bentota Ganga region in particular can be deducted. However, already KELAART (1852) noted their presence in the southwestern part of the island. He mentioned that the species is common in the large rivers of the island including the Mutwal River near Colombo occurring also in the Southern provinces.

The situation of the habitat quality of *C. porosus* can be characterized into several categories according to their degree of intactness or loss (fig. 15 and 16).





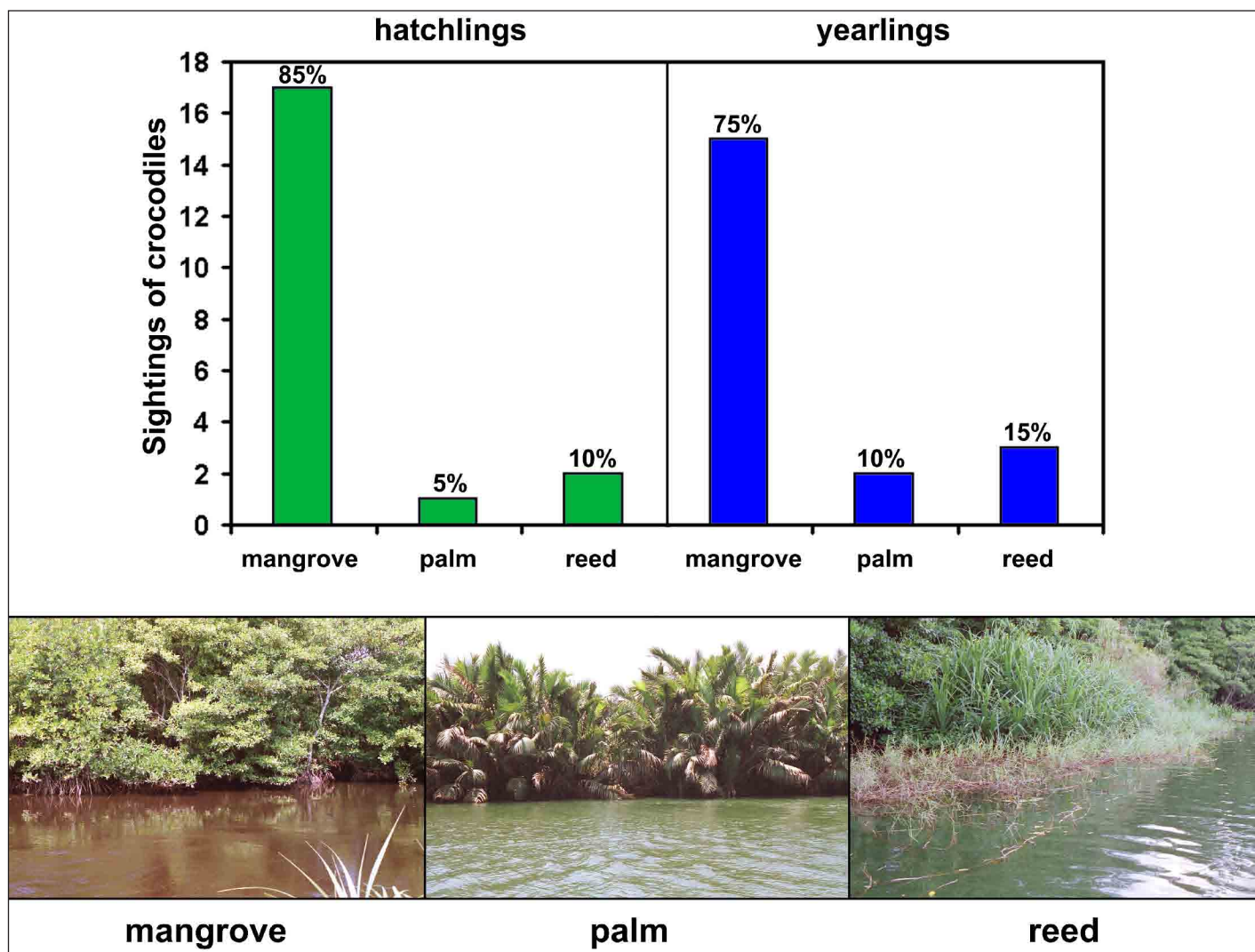


Fig. 14: Association of sighted hatchlings and yearlings of *Crocodylus porosus* to bank vegetation.

### Hunting / Killing

Larger specimens from about 1.50 m onwards are still being hunted and eaten in the whole area of the Bentota and Welipenne Ganga. This is certainly also reflected in the few sightings of crocodiles of these size classes. Since the crocodile hunters are perfectly aware that they are doing something illegal the meat is sold only in secrecy. Recently DEVAPRIYA (2004) published a report showing the various ways *C. porosus* is still being killed in the Muthurajawela marshes of Sri Lanka. His study also showed that there is a considerable need for education in the local people how to be able to live with crocodiles and the demanded public awareness work (WHITAKER & WHITAKER 1977) has not yet been organized and carried out.

Some means of catching *C. porosus* have not much changed today since DERANIYAGALA'S (1939) account. To attract the crocodile's attention a chicken or if not available a puppy or a grown dog is tied to a branch and swimming in the water close to the bank. The flapping of the wings or the yelps of the dog attracts the crocodile and when it has taken this as bait and started to roll it is tried to spear it into the belly from the bank.

Today the crocodiles of the Bentota Ganga area are still very much feared by local people. This was certainly even more the case in the past when probably many more larger specimens were inhabiting the river causing human deaths (for a summary of older data see DERANIYAGALA 1939). He also wrote that *C. porosus* is usually a man-eater and at around the time of his publication the species claimed many human victims annual-

ly. As an example he also mentioned the "Bentota man-eater" which devoured two persons before it was caught and killed. This specimen is possibly identical with the "White Face" described by VAN DE BONA (1996) and KARUNATHILA ka (1991). This "Bentota man-eater / White Face" had a total length of 2.7 m (DERANIYAGALA 1939). According to VAN DE BONA (1996) this "White Face" (Muna suddha kibula) lived in the Welipenne Ganga and Kuruduwatta and had a total length of about 4.50 m (ca. 15 feet). It seems likely that there more than one large crocodile living in the Bentota Ganga area which, due to failed attempts to catch and kill them or simply from beating them with sticks to drive them away, were bearing scars on the head. Whenever such a crocodile was seen it was possibly referred to as "White Face". VAN DE BONA (1996) writes that especially fishermen tried to kill crocodiles whenever possible and because this was not allowed officially all preparation and killing was done secretly. Finally a "White Face"-crocodile was shot by a person owning a rifle. KARUNATHILA ka (1991) gives another story of "White Face". Since this crocodile had caught catamaran fishermen many times it was decided to kill it using also a motor boat. However, the boat was attacked and everyone fell into the water, but there were no casualties.

Curiously enough up to now no educational information how to live with crocodiles in the river were ever given by authorities to local people at the Bentota Ganga nor were ever measures taken to warn locals by signs or protect them and their live stock by fences from the crocodiles. At least partly this negligence may have caused casualties which in turn may seem to justify it to kill the larger and more dangerous crocodiles.



The small number of sighted adults is certainly largely due to the decimation over a long period of time. Associated to this is the increased wariness of remaining larger specimens. Undoubtedly the surviving larger crocodiles of the Bentota Ganga area are those which have learned to be most secretive and extremely wary.

It seems likely that in the various unsuccessful attempts to catch a particular individual ("White Face") a number of other large crocodiles were caught instead. These were most probably not released by the crocodile hunters. Furthermore DERANIYAGALA (1937) reported that within three years four nests of *C. porosus* were found in western Sri Lanka and that two guarding females were shot either by his companions or by himself (DERANIYAGALA 1936). These crocodiles were probably not the only ones killed in such a situation.

### Disturbance

How much the crocodiles feel disturbed by human activities is difficult to say. However, it is assumed here that any non-natural activity which is not likely to occur in an area inhabited by *C. porosus* has some potential of disturbing the crocodiles.

The following list encompasses a number of human activities observed in the river section NNW of the bridge connecting the towns Aluthgama and Bentota: windsurfing, jet skiing, canoeing, water skiing, speed boat driving, tourist boat tours, etc.

At the moment disturbances by any of the tourism related activities last in fact until sunset. Fishing activities start just at about that time when daytime tourist activities cease.

Large areas of the Bentota Ganga are utilized for sand extraction. On 04 October 2008 between 11:30 and 12:45 hrs and located between the coordinates N 06°21'59.5 / E 80°07'49.1 and N 06°23'41.5 / E 80°05'48.8 thirty nine boats were counted used for sand extraction (fig. 17). In these areas no crocodiles were observed. From the point of habitat quality a presence of crocodiles in this area is possible though, but due to the activities and boat traffic the crocodiles have either moved to quieter parts of the river or behave more secretly.

### Photopollution

There is a possible negative effect of photopollution on the orientation of *C. porosus*. BROCK (1960a) reported that he repeatedly observed his captive crocodilians sneaking towards light sources during the night.

The crocodiles especially of the Kaluwamodera Ganga and Bentota Ganga are under influence of a number of artificial light sources along the banks. They stem from: A – public houses (hotels, guest houses, private houses), B – illumination of bridges over rivers, C – boats (entertainment for tourists, local fishermen) and D – fireworks (only occasionally). Especially the installed and continuously switched on lights or for a large part of the night may have an effect on the behaviour of the crocodiles.

BOLTON (1989) described *C. porosus* as bold and that the species able to learn quickly to feed on offered food. So when food is involved still some few crocodiles possible lose their wariness. I assume that the specimen on 30 September 2008 (20:42 hr) and the one of 06 October 2008 (19:25 hr) are the same although the locations are about 2500 m away from each other. In both instances the length of the discovered crocodile was estimated of the same length (around 1.90 m) and in both cases discarded meat was involved (1<sup>st</sup> Ramadan festivities from a Muslim school with discarded cattle and goat meat thrown into the water, 2<sup>nd</sup> a weekly market with fish and chicken left overs thrown into the water). Both locations are on the same side of the river. Finally both installations were

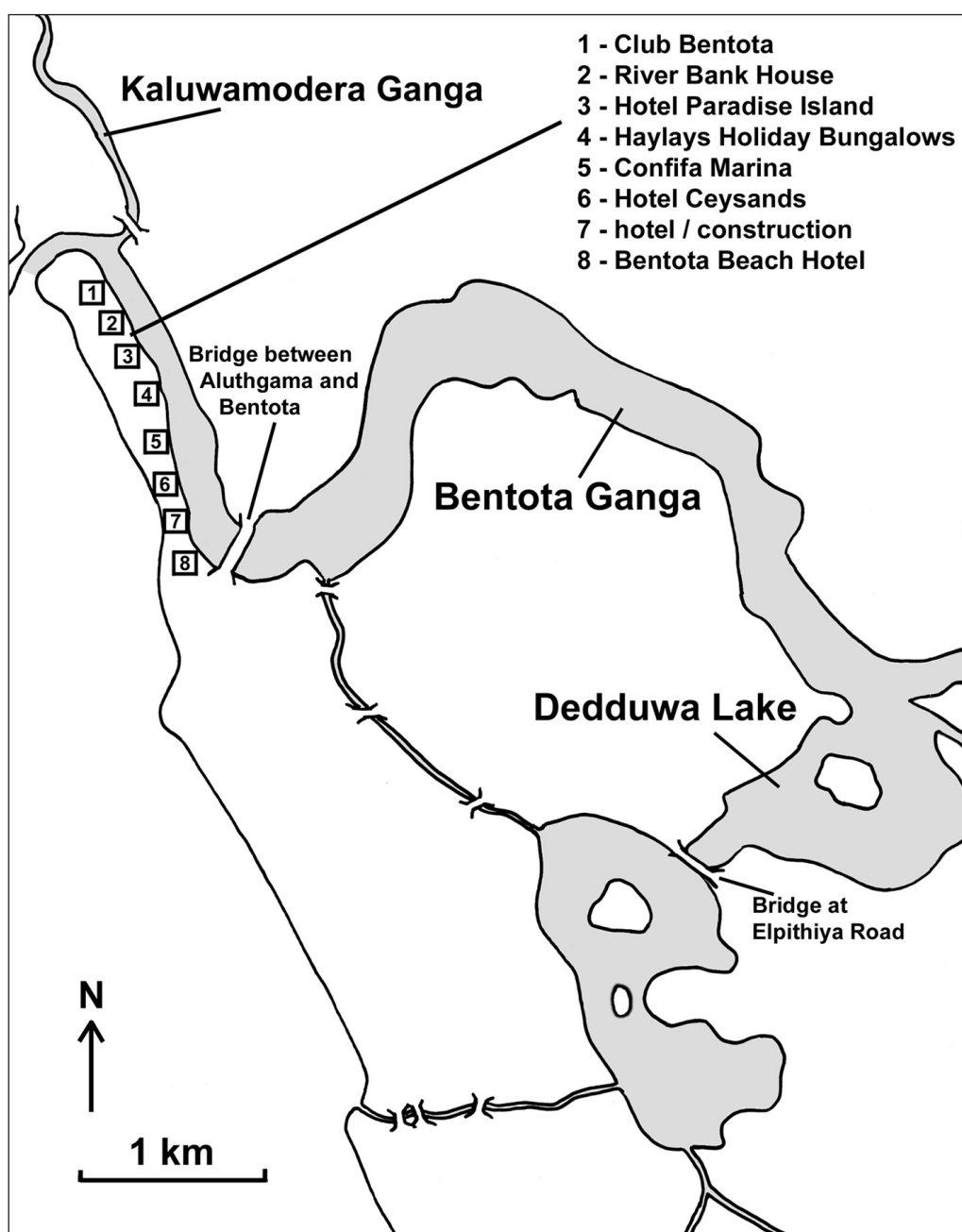


Fig. 15: Western part of the study area with the position of hotel buildings.

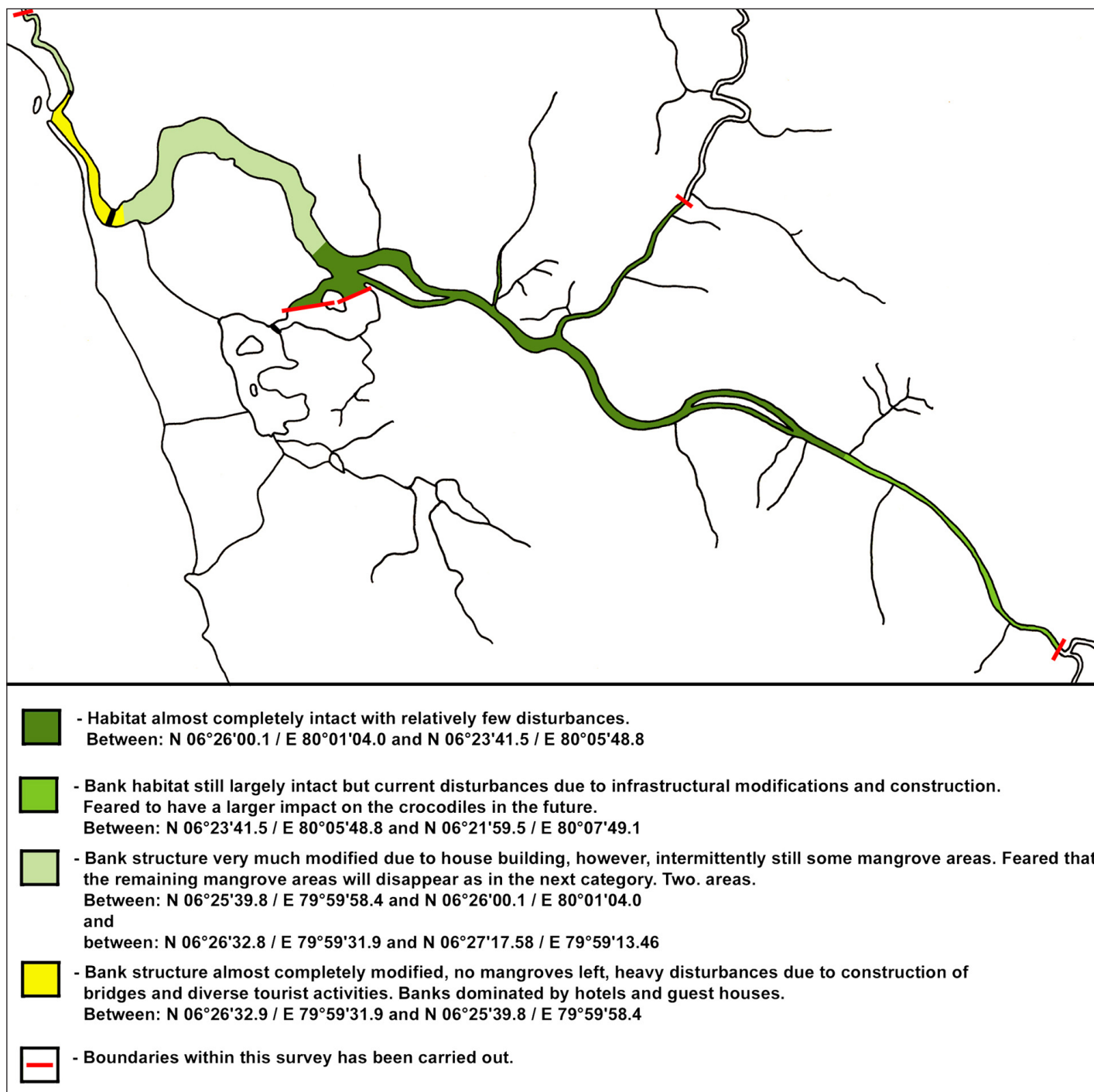


Fig. 16: Study area showing different river sections according to their habitat quality.

strongly illuminated for a number of hours after sunset. It is possible that this individual is making a connection with the light and a possible food source.

#### Future threats

It is planned that parts of the crocodiles' habitat to be transformed into recreational areas for tourism. In the western sector of the Dedduwa Lake a number of guest houses shall be build with the possibility for canoe trips on the lake.

Furthermore the situation for the crocodiles in the middle section will get worse in the near future. The "Southern Transport Development Project" which is currently under construction encompasses a multi-lane motorway between Kottawa and Matara (Southern Transport Development Project ([www.fabm.gov.lk/downloads/stdp.pdf](http://www.fabm.gov.lk/downloads/stdp.pdf))). At the position N 06°23'20 / E 80°06'25 (fig. 18) this motorway will cross the Bentota Ganga. The bridge is still under construction (fig. 17). After completion the motorway will run ac-

cross the whole region which was regarded by WHITAKER & WHITAKER (1979) as very important for *C. porosus*.

#### Natural predators

A natural threat for nests and hatchlings is possibly *Varanus salvator* which occurs in large densities in the area (DERANIYAGALA 1936, DANIEL 1983, GRAMENTZ 2008b). WHITAKER & WHITAKER (1978) consider *V. salvator* a potential predator of *C. porosus* nests at North Andaman. WILSON (1971) observed a monitor digging out a crocodile nest at Sri Lanka. The predation on nests and hatchlings by *V. salvator* in already threatened crocodile populations has an even more significance.

#### Recommendations and considerations

The recommendations listed below refer not only the main stream of the Bentota Ganga but to all waterways in the study area as side creeks and tributaries as for example the Welipenne Ganga.



- At no location and at no time should it be allowed that fishing nets are stretched from one side of the river bank to the other.
- No crocodiles which were inadvertently caught in fishing nets or other fishing gear have to be killed.\*1
- Police should patrol the waterways in irregular intervals during day and night.
- Sand digging has to be stopped immediately.
- As disturbance is beside killing and habitat destruction a threat for the crocodiles as it keeps them away from a former inhabited area all “water sport activities” as: jet ski, water ski, banana boat, wind surfing speed boat driving and other related activities have to be stopped completely. This is also meant as a safety instrument. In case crocodiles are effectively protected in the future and allowed to grow they could of course become potentially dangerous to tourists falling into the water during their activities. Resulting casualties due to carelessness would turn the mind of the public against the crocodiles.
- At various locations, especially those with easy access to the river, signs should be posted in Sinhalese and English that the river is inhabited by crocodiles and swimming is prohibited (fig. 19). In layout and background colour these signs should be similar to those already existing used for traffic. The signs also should have the effect on the public that the presence of the crocodiles is officially acknowledged. Possibly not more than ten sign should be needed.
- At hotels and guest houses information leaflets should be available informing on the presence of saltwater crocodiles in the Bentota Ganga along with basic data on their life history and explaining their need for conservation.
- Absolutely no permission should be granted for new houses or the extension of those already built on the bank of the rivers and lakes. In case of illegal start of construction this has to be removed on the costs of the owner and the original state of the bank has to be installed. To prevent further destruction of habitat, conflict potential between man and crocodiles, increased boat traffic and other disturbances no development should be carried out or allowed in the still rather intact sections of the rivers and lakes.
- In all buildings close to the banks of the river the lamps should be screened.
- Fireworks which would be visible and audible at the rivers should completely be stopped, because they probably irritate the acoustic communication of the crocodiles. (On New Year's Eve BROCK 1960b noted a modification of the behaviour of his *C. niloticus* which was usually silent. After each bang of the fireworks the crocodile responded with one short and loud roar).
- The dumping of animal waste from markets etc. into the Bentota Ganga should be stopped as it has a large conflict potential between crocodiles and man.
- In case conservation efforts show a recovery of the population of *C. porosus* at some places as little settlements along the river bank crocodile fences have to be erected to protect local people and their livestock.
- Off-shore fishermen also have to be informed of the protection of the crocodiles and no crocodiles have to be killed which may inadvertently have been caught by them.
- By all means it should be prevented that due to carelessness and /or disinformation local people or tourists fall victim to crocodile attacks. In case of attacks or fatal injuries of humans the result would likely be, like in the past, more killings of crocodiles which would believe their action justified due to human loss of life.
- There is of course a long time history of fishing in the river. A number of human casualties resulted in the construction of the boats used for fishing. These boats are always open and rather low. They mainly consist of a main hull not unlike a canoe but have an additional swimmer for balance on one side and are locally named catamarans (fig. 20). A boat type which is higher, with a wider hull for stability in the

Fig. 17: Study area showing current disturbances and construction sites along the Bentota Ganga.

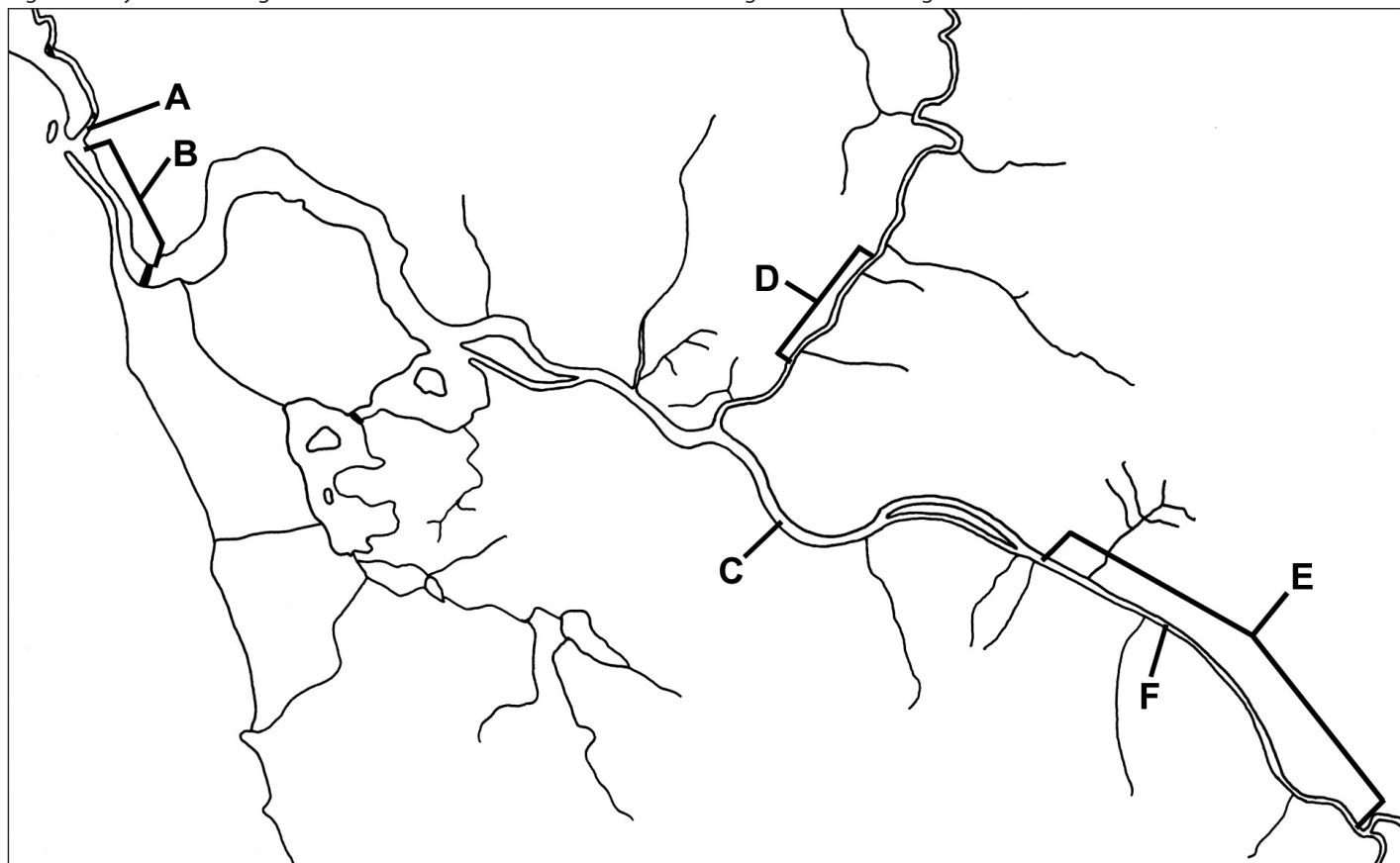




Fig. 17 - A: Boat traffic, Kaluwamodera Ganga.



Fig. 17 - B: Tourist boats, Bentota Ganga.



Fig. 17 - B: Water ski, Bentota Ganga.



Fig. 17 - B: ?, Bentota Ganga.



Fig. 17 - B: Rubber tubes, Bentota Ganga.



Fig. 17 - B: Jet ski, Bentota Ganga.



Fig. 17 - B: Windsurfing, Bentota Ganga.



Fig. 17 - B: Excursion boat, Bentota Ganga.



Fig. 17 - B: Kayaks, Bentota Ganga.



Fig. 17 - B: Banana boat, Bentota Ganga.



Fig. 17 - B: Cultivated bank structure, Bentota Ganga.



Fig. 17 - B: Car and railway bridges, Bentota Ganga.



Fig. 17 - B: Photopollution.



Fig. 17 - B: Fireworks.



Fig. 17 - C: Fishing net.





Fig. 17 - D: Sand extraction, Welipenne Ganga.



Fig. 17 - D: Sand extraction, Welipenne Ganga.



Fig. 17 - E: Sand extraction, Bentota Ganga.



Fig. 17 - E: Sand extraction, Bentota Ganga.



Fig. 17 - F: Construction site of motorway bridge, Bentota Ganga.



Fig. 17 - F: Construction site of motorway bridge Bentota Ganga.



Fig. 17 - F: Construction site of motorway bridge.



Fig. 17 - F: Construction site of motorway bridge.



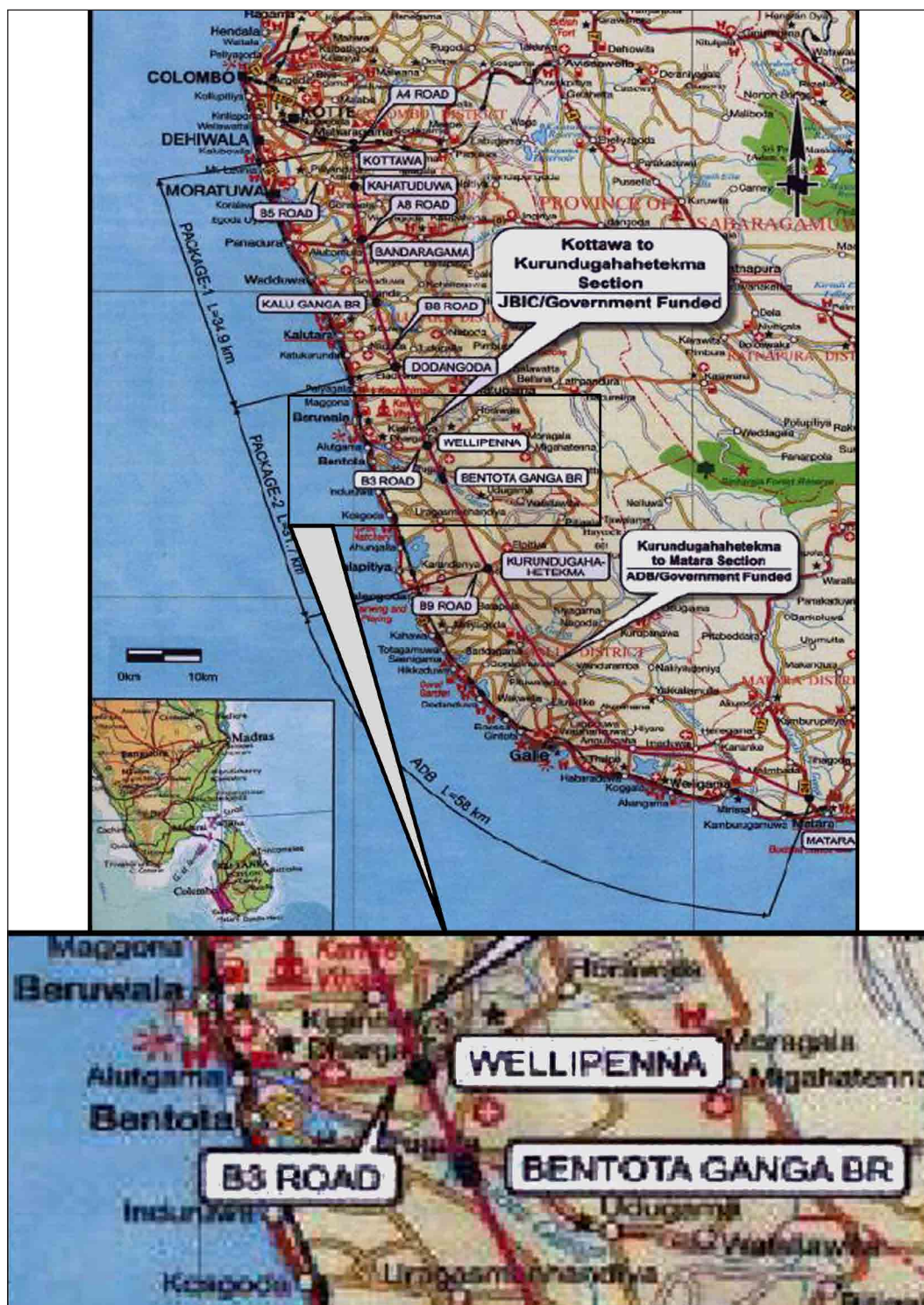


Fig. 18: Map of the Southwest coast of Sri Lanka showing the course of the motorway under construction. Insert showing the position of the bridge crossing the Bentota Ganga (modified from [www.fabm.gov.lk/downloads/stdp.pdf](http://www.fabm.gov.lk/downloads/stdp.pdf)).

from the mouth particularly those in and above the two to three year old category. In fact in this study a specimen which was sighted closest to this area was approximately 1.90 m in total length (fig. 12). The distance from that sighting to the mouth of the Bentota Ganga is about 2.3 km. It is therefore possible that in this already depleted population at least some specimens from the Bentota Ganga leave the river for the Indian Ocean. On the other hand the mouth of the Kaluwamodera Ganga lies opposite the mouth of the Bentota Ganga into the ocean and the crocodiles also have the chance to enter this river.

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AGITH SENARATHNE (Bentota) and AMILA SADARUWAN (Aluthgama) prevented us during night surveys that we were not running into something we better shouldn't run into. JAGATH SENARATHNE (Bentota) and MANJU GUNAWARDANA (Aluthgama) assisted during night and day surveys searching for crocodiles whereas MANJU GUNAWARDANA always showed great boat driving skills.

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water and more closed construction on top would certainly reduce the risk for fishermen and when used as a ferry boat. A better boat type would certainly improve the safety of the fishermen from large crocodiles, however simply because of the nature of their work the risk of a crocodile attack will remain.

\*1 Should the crocodiles because of their size impose a threat to the fishermen the release should to be done by specialists. The safety of both humans and crocodiles has priority over material damages. A fund could be raised for compensation of damaged fishing gear for local people.

If disturbance factors in the lower section of the river are actually prevented in the framework of future conservation measures a problem could appear from natural movements by certain age classes. WEBB (1977b) noted that rivers could lose crocodiles



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Fig. 19: Proposal for a warning sign in Sinhalese saying: "Attention. No swimming. Crocodiles in the water."





Fig. 20: Postcard showing the typical boat type used for fishing and as a ferry on the Bentota Ganga.

### Final Personal Note

The crocodiles in the Bentota Ganga and its tributaries are very close to disappearing completely. Especially the larger size classes which have been terribly decimated in the past. However, being usually of a rather optimistic disposition I actually don't expect that the Sri Lankan Government will make effective and serious efforts to protect the crocodiles in the waterway system of the Bentota Ganga at any time. I very much doubt that they want to see the animals reintroduced into areas which were once inhabited by them. Also I doubt very much that they are able to organize police controls by boat and stop any illegal activities in that area including the killing of crocodiles. Instead, as mentioned before (GRAMENTZ 2008a), I expect the Sri Lankan Government to continue to ignore the problems the *C. porosus* population is facing in that area.