

Chapter-5

Bhitarkanika: Salt water crocodile

Salt water crocodile, an introduction

The **Saltwater** or **Estuarine Crocodile** (*Crocodylus porosus*) is the largest of all living reptiles. It is found in suitable habitat throughout S.E. Asia and northern Australasia.

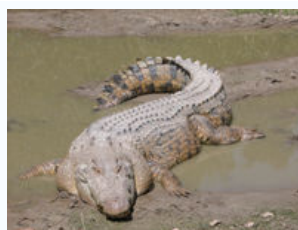
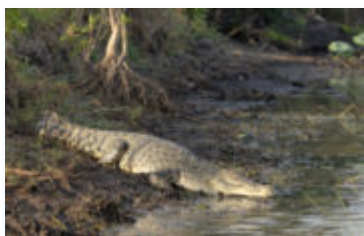


Anatomy and Morphology

A healthy adult male saltwater crocodile is typically 4.8 to 5 metres (15.75 to 16.6 ft) long, and weighs roughly 770 kg (1697 lb), with very rare exceptions being larger than this.^[1] The largest confirmed saltwater crocodile on record was 20.6 feet (6.3 meters) long, and probably weighed well over 1,900 kg.^[2] Many larger sizes have been reported,^{[1][2]} but these have generally been discredited as exaggerations. Examinations of incomplete remains have never suggested a length greater than 23 feet (7 meters).^[2] Females are much smaller than males, with typical female body lengths in the range of 2.5–3 metres.

Distribution

Saltwater crocodiles are severely depleted in numbers throughout the vast majority of their range, with sightings in areas such as Thailand, Cambodia, Laos and Vietnam becoming extremely rare and the species may in fact even be extinct in one or more of these countries. With that said, it is also the least likely of crocodylians to become globally extinct due to its wide distribution and almost pre-colonial population sizes in Northern Australia and New Guinea. In India this crocodile is extremely rare in most areas but is very common in the north eastern part of the country (mainly Orissa and the Sunderbans). The population is sporadic in Indonesia and Malaysia with some areas harboring large populations (Borneo for example) and others with very small, "at risk" populations (the Philippines). The saltwater crocodile is also present in very limited portions of the South Pacific, with an average population in the Solomon Islands, a very small & soon to be extinct population in Vanuatu (where the population officially only stands at three) and a decent but at-risk population in Palau (possibly rebounding).



Saltwater crocodiles have earlier prevailed as far west as the east coast of Africa at the Seychelles Islands, and all the way up the coast of Africa until the arrival of Europeans put an end to their spreading. These crocodiles were once believed to be a population of Nile crocodiles, but they were later proven to be *Crocodylus porosus*.

Habitat

Saltwater crocodiles generally spend the tropical wet season in freshwater swamps and rivers, moving downstream to estuaries in the dry season, and sometimes travelling far out to sea. Crocodiles compete fiercely with each other for territory, with dominant males in particular occupying the most eligible stretches of freshwater creeks and streams. Junior crocodiles are thus forced into the more marginal river systems and sometimes into the ocean. This explains the large distribution of the animal (ranging from the east coast of India to northern Australia) as well as it being found in odd places on occasion (such as the Sea of Japan, for instance). Saltwater crocodile speed underwater can be 15 to 18 miles per hour in short bursts, but when cruising can go 2 to 3 miles.

Behaviour

The saltwater crocodile is an opportunistic predator capable of taking animals up to the size of an adult male water buffalo, either in the water or on dry land. Juveniles are restricted to smaller items such as insects, amphibians, crustaceans, small reptiles and fish. The larger the animal grows, the greater the variety of items that it includes in the diet, although relatively small prey still make up the majority of the diet even in adults. Saltwater crocodiles can take monkeys, kangaroo, wild boar, dingos, goannas, birds, domestic livestock, pets, water buffalo, sharks, and humans. Generally very lethargic – a trait which helps it survive months at a time without food – it typically loiters in the water or basks in the sun through much of the day, usually preferring to hunt at night. Whilst capable of explosive bursts of speed when launching an attack from the water, crocodiles are incapable of sustaining that speed on land. Indeed the reported stories of crocodiles being faster than a race horse for short distances across the ground are little more than urban legend.

As an ambush predator, it usually waits for its prey to get close to the water's edge before striking without warning and using its great strength to drag the animal back into the water. Most prey animals are killed by the huge jaw pressure of the crocodile, although some animals may be incidentally drowned. It is an immensely powerful animal, having the strength to drag a fully grown water buffalo into a river, or crush a full-grown bovid's skull between its jaws.

In its most deadly attack, nicknamed the "Death Roll," it grabs onto the animal and rolls powerfully. This is designed to initially throw any struggling large animal off balance making it easier to drag it into the water. The "Death Roll" is also utilised as a method for tearing apart large animals once they are dead. In one case in Northern Australia in 1939, a prize Suffolk stallion weighing over 1 tonne (2,205 lb) was killed, apparently in under a minute, by a large crocodile.

In the water, a crocodile is twice as powerful as it is on land and much faster. A healthy crocodile can swim as fast as a dolphin in short bursts. A crocodile has the power and strength to pull a water buffalo weighing 2200 pounds in the water. Capturing crocodiles takes people

power and a strong rope. To pull and jump on a 16 foot saltie will take 10 fully grown people using all their strength if the crocodile feels threatened.

Intelligence

Dr. Adam Britton, a researcher with Wildlife Management International, has been studying crocodilian intelligence. In so doing, he has composed a collection of Australian saltwater crocodile calls, and associated them with behaviors. His position is that, while crocodilian brains are much smaller than that of mammals (as low as 0.05% in the saltwater crocodile), they are capable of learning hard tasks with very little conditioning. He also infers that the crocodile calls hint at a deeper language ability than currently accepted. He suggests that saltwater crocodile are smart, clever animals that can possibly learn faster than lab rats.

Saltwater Crocodiles in India:

It is known by various names in different parts of the country, such as:

English: Saltwater Crocodile, Estuarine Crocodile.

Oriya: Baula kumbhira, Kuji Khumbhiora.

Hindi, Gujarat, Marathi: Muggar.

Bengali: Kuhmir.

Kannada: Mossalay.

Tamil: Muthalai.

Telugu: Moseli.

Malayalam: Muthala, Cheengkani.

Distribution, Habitat & Size: The largest skull available measures 1 metre in length and it is believed to have belonged to a specimen of about 7 metres in length. Specimens over 5m in length have been obtained in the Sunderbans and Orissa's river estuaries but are now exceedingly rare. A 4.5 m long captive specimen weighed 408 kg.

In India, the estuarine crocodile is restricted in its distribution to the tidal estuaries, marine swamps, coastal brackish water lakes and lower reaches of the larger rivers. The saltwater crocodile has a vast geographical range that extends from Cochin on the west coast of India to the Sunderbans in West Bengal and to the Andaman Islands. Single individuals can be found some distance from their usual range as they can travel long distances (over a thousand km) by sea. Barnacles have been found on the scales of a few stray individuals. This sea-faring ability probably helps to explain their wide distribution.

The **species** is seriously endangered, from hunting and now largely from loss of habitat, particularly breeding sites. Surveys in the Andamans have brought to light the precarious

position of the animal in the Andaman and Nicobar Islands. It is now extinct in Kerala and Tamil Nadu. A sanctuary for the species has been established in the Bhitarkanika Island and Adjacent areas in the Brahmani Baitarni river estuary in Orissa.

As its name implies, this species has a high tolerance for salinity, being found in brackish water around coastal areas and in rivers. However, it is also present in freshwater rivers and swamps. Movement between different habitats occurs between the dry and wet season, and as a result of social status - juveniles are raised in freshwater areas, but eventually sub-adult crocodiles are usually forced out of these areas (used for breeding by dominant, territorial adults), into more marginal and saline areas. Subordinate animals unable to establish a territory in a tidal river system are either killed or forced out into the sea where they move around the coast in search of another river system.

Appearance: Largest living crocodylian species (in fact the largest living reptile in the world), adult males can reach sizes of up to 6 or 7 metres (20 to 23 feet). There is always a lot of interest over the largest ever recorded saltwater crocodile. In general, males over 5 m (17 feet) in length are extremely rare. Females are smaller, and do not normally exceed 3 m (10 feet), with 2.5 m being considered very large. This is a large-headed species with a heavy set of **jaws**. A pair of ridges run from the eye orbits along the centre of the snout. Scales are more oval in shape than other species, and scutes are relatively small. Juveniles are pale yellow in colour with black stripes and spots on the body and tail. A small percentage of animals in some regions tend to be much lighter in colour. The juvenile colouration persists for several years, growing progressively paler and less colourful with more indistinct bands which eventually disappear. Mature adults are generally dark, with lighter tan or grey areas. The ventral surface (belly) is creamy yellow to white in colour, except the tail that tends to be grey on the underside nearer the tip. Dark bands and stripes are present on the lower flanks, but do not extend onto the belly region.

Diet: Saltwater crocodiles take a wide variety of prey, although juveniles are restricted to smaller items such as insects, amphibians, crustaceans, small reptiles and fish. The larger the animal grows, the greater the variety of items that it includes in the diet, with only the smaller items taken less frequently. Prey items include crustaceans and vertebrates (e.g. turtles, snakes, shore and wading birds, buffalo and domestic **livestock**, wild boar, monkeys).

Breeding: Breeding territories are established in freshwater areas. Females reach sexual maturity at 10 to 12 years of age. Males mature later at around 16 years of age. 40 to 60 eggs are usually laid in mound nests made from plant matter and mud. These are constructed between the months of November and March during the wet season. This serves to raise the eggs above the ground to help prevent losses due to flooding. Alternately, if the nest is in danger of getting too dry, the female has been known to splash water onto it from a purpose-dug pool. Juveniles hatch after around 90 days, although this varies with nest temperature. The female digs the young out of the nest when they start their characteristic chirping sounds, assisting them to the water by carrying them in her mouth. Restocking programs in India (Bhitarkanika National Park in Orissa) have met with success.

Crocodiles of Bhitarkanika



In Orissa, the estuarine or Salt water crocodile (*Crocodylus porosus*) is restricted to the mangrove swamps of the Brahmani-Baitarani Delta of North-Eastern portion of the State which comes within the Bhitarkanika National Park. Around mid nineteen seventies, the population of these salt water crocodiles had gone down to a critical level, leaving only a small viable population in the main Bhitarkanika river and a few adjoining creeks. The decline of population was mostly due to over exploitation, poaching and indiscriminate hunting. To save these greatly endangered species from extinction, a conservation programme was launched by the State Govt., through Forest Department.

This project was started with active assistance from the Food & Agriculture Organisation of the United Nation's Development Programme. The major achievement of this project in its first phase has been to rear and rehabilitate the salt water crocodile. Apart from rearing and releasing 1717 crocodiles in the nature, 26 captive reared crocodiles have been supplied to other State projects.

The programme for conservation of estuarine crocodile and its habitat was mooted in the year 1975 by Dr. H.R Bustard, the FAO/UNDP Consultant. The entire mangrove habitat was declared as Bhitarkanika Wildlife Sanctuary on 22.4.1975 to protect the Salt Water Crocodiles. The project started at Dangmal. Illegal trapping & killing of crocodile was stopped. Every step was taken to protect the adult, sub-adult and juveniles. The practice of collection of eggs from the Wild and their subsequent incubation technique was preferred to build up the depleted population. The reared crocodiles of 1.2 meter length were released into the creeks and creek-lets.

Annual census of crocodiles is being undertaken in the mid winter. The population estimation is done by direct sighting in various creeks and rivers in both day and night. The night counting gives a better result of hatchlings & yearlings. Since identification is easy during night. The crocodiles are classified into different categories as per age gradation viz; upto 2'-4" - yearlings 4'-6" Juveniles, 6'-8" sub-adults and beyond 8' -0" adults. The presence of all age classes of crocodiles is a healthy sign of a viable population.

Crocodile Census

Year	Hatchling	Yearling	Juvenile	Sub-adult	Adult	Total
1995-96	304	71	34	21	10	511
1996-97	136	232	161	63	68	660
1997-98	252	106	121	113	76	668
1998-99	149	146	160	144	72	672
1999-2000	319	181	123	145	146	914
2000-2001	341	277	237	136	107	1098
2001-2002	431	328	182	138	206	1285

Baula Kumbhira (White crocodile)



CROCODILIANS

ORDER : CROCODILIA

FAMILY : CROCODYLIDAE

GENUS : CROCODYLUS

Crocodylus Porosus (Schneider)

(The Estuarine or the saltwater crocodile)

Status : Included under Schedule -I of Wildlife (Protection) Act, 1972, and endangered as per Red Data Book categories of IUCN, and also Included in Appendix-I of CITES. River systems of Bhitarkanika wildlife sanctuary and its fringe areas are the last stronghold of the species in Orissa. The estuarine or the salt water crocodile (*Crocodylus porosus*) is known to be the largest (7 mt.) among all species of the living crocodiles in the world. It inhabits the deltaic regions of Bramhani, the Baitarani, Dhamra and Mahanadi river systems of the State and in the estuaries of these rivers where there is regular flow of tidal waters from the sea. These rivers and deltaic areas are the best preferred habitats of this species.

The saltwater crocodiles are carnivorous and scavengers. The species lives mainly on fish (predatory fish). It often feeds on carcasses flowing into the area from nearby human habitations and occasionally feeds on cattle, deer, sambar and wild pigs etc. Female saltwater crocodiles nest in mangrove forests preparing a mound nest unlike other species of crocodiles which usually dig a nest on sandy river banks.

Mating takes place during February to April. Nests are made in May. An average of 45 eggs are laid. Hatchlings emerge from the eggs after 70-80 days. Mother Crocodile actively guards the nest by remaining in a wallow in the vicinity of the nest. The nests are usually prepared by the mangrove twigs, leaves, mud etc. Nests are usually made in areas on high ground which will not be inundated during the highest high tide of flood waters during the rainy season and where it can get direct sunlight.

Attack on human beings by Wild Crocodiles :

The saltwater crocodile is stated to be the most dangerous species of crocodilians from a human standpoint. In the Bhitarkanika Wildlife Sanctuary all the possibilities for human attack exist. Particularly, human beings are prone to attack when they intrude illegally into the crocodile habitat, where the male crocodiles preponderate. But it has been observed that the adult crocodiles under normal circumstances never leave their territory to chase the human beings on land unlike terrestrial predatory animals like tigers. Most of the incidents occur when the victims enter into the crocodile habitat either for illegal fishing, poaching, collection of wood, honey and Nalia grass etc. from the river or creek banks or while setting the traps or noose for trapping the deer, wild boars etc. very close to river or creek banks.

Causalty of Human Being & Cattle by Crocodile In Bhitarkanika:

Year	No. of Human Being Killed	No. of Cattle Killed
1996-97	3	12
1997-98	2	4
1998-99	1	3
1999-2000	2	4
2000-2001	3	2
2001-2002	2	1
2002-2003	1	5

Attack on domestic livestock by Wild Crocodiles :

High tide is usually essential to bring the crocodiles waiting calmly in the water within striking distance of the animals grazing on the river bank. 90% of the attacks occur during the rainy season when the river banks are flooded by high tide or flood water. That too at locations where the natural cover by mangrove vegetation had been destroyed by the people. Cattle attacks increase the unpopularity of the salt water crocodiles and increase the pressures working against its conservation. The solution lies in maintaining a strip of undisturbed mangrove forests at least 100 meters wide along all rivers/creeks adjacent to cultivated land and human habitations inside the Sanctuary.

Sources:

- *Mangrove Forests and Wildlife of Orissa (Oriya) by Mr.N.C.Mohanty published by Project Swarajya, Cuttack, Orissa 1992*
- <http://www.bhitarkanika.org>
- http://en.wikipedia.org/wiki/Saltwater_crocodile