

Crocodile vs. man

Can there only be one winner?

Colin Stevenson provides an informed insight and perspective on attacks by crocodiles, and what can be done to minimise the risks, while conservationists battle to increase the numbers of these ancient reptiles again, after they have suffered many years of hunting and persecution.

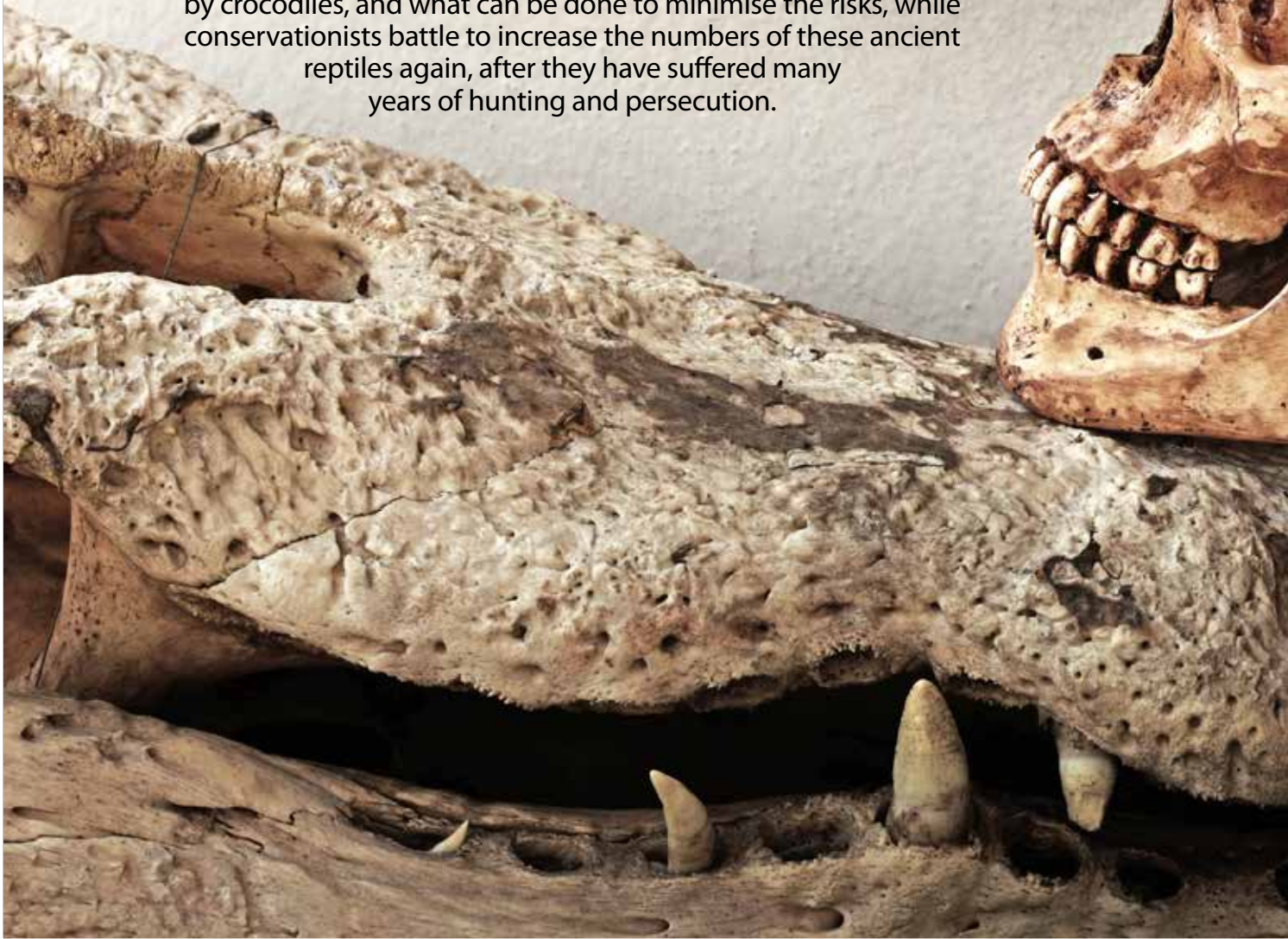


Photo courtesy Jannarong/www.shutterstock.com

Many people around the world today can put their dirty clothes in a washing machine, luxuriate in a warm bath or shower, and then step out and enjoy a cup of tea or coffee, in the safety of their home. Yet for most of human history until very recently, water was gathered from rivers, streams, lakes or from wells.

Indeed, in much of the developing world today, this still remains the case. And of course, if those rivers and lakes are in the tropical or subtropical zones, they may be home to crocodilians. Frequent news stories about crocodile 'attacks', assorted movies featuring over-sized crocodiles eating everyone in sight, and all the crocodile documentaries

you've ever seen showing Nile crocodiles tearing wildebeest or zebras apart serve to feed our paranoia about these remarkable reptiles.

But what is the reality and risk? It's important to recognise that in actual fact, crocodile attacks and crocodile conservation are different sides of the same coin. So let's begin this investigation by winding back the clock to see how things have changed with regard to crocodiles, along with their conservation and our dealings with them, down through the millennia.

Ask not what crocodiles have done to us...but what we have done to them!

People living in areas of the world

➤ A representation of the ancient Egyptian crocodile-god, called Sobek, portrayed on the Temple of Kom Ombo in Egypt.

Photo courtesy Anton_Ivanov/www.shutterstock.com





▲ A rare sighting these days - a group of gharials in one of their last remaining strongholds on the Chambai River in India.

Photo courtesy kunaljain7/www.shutterstock.com

▼ This was the view of crocodiles related by early European explorers, who saw them as lethal killers - although we now know only a minority of species represent a danger to people. Once firearms became widely available, so crocodilians were themselves vulnerable to attack, as they could then be killed safely from a distance. This illustration featured originally in a French natural history book by the Comte de Lacépède, published in 1788.

Photo courtesy Morphart Creation/www.shutterstock.com

primal about large predatory species. All large predators rely on stealth, and those that lurk beneath the water strike a particularly deep fear in people, because we can't see them - until it's too late!

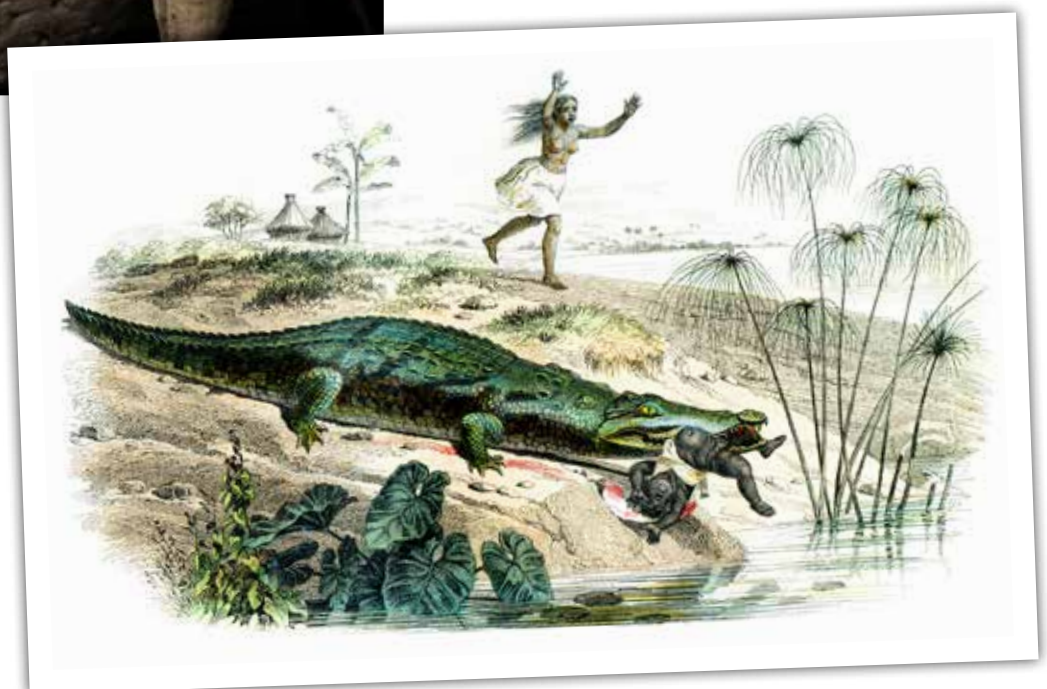
Travellers' accounts

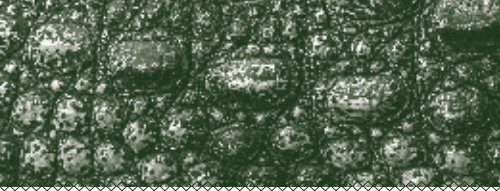
Regardless though, to have travelled within crocodile or alligator habitats during the early 1800s would have been exhilarating. Contemporary reports from explorers or travellers from those times universally describe the local crocodilians as abundant, with the rivers 'teeming' with these saurians. Reliable witness accounts describe hundreds of crocodiles visible just outside the major cities at that time.

Many Europeans travelling downriver in the tropics would amuse themselves by shooting crocodiles from their boats as the animals basked on the shores. Their

where crocodiles abound have developed myths and legends about these predators, creating rituals and beliefs that they hoped would keep them safe from attacks. Ancient writings and paintings depict the power of crocodiles, ranging from Australian Aboriginal people and their Dreamtime stories to the ancient Egyptians (with their crocodile-god, Sobek). Other cultures, including the Greeks, Romans and Mayans also incorporated crocodiles in a similar way into their cultures, particularly as their empires spread.

This isn't surprising: crocodilians have always preyed on people, just as we have always killed and/or eaten crocodiles. But there is something





The range of the Cuban crocodile is much reduced today. This individual was photographed swimming in an area of mangrove in the Gardens of The Queen, which is the Cuba's first marine park. Note the protective membrane that covers the eye underwater, enabling the crocodilian to see in these surroundings.

Photo courtesy wildestanimal/www.shutterstock.com



populations at that stage were so dense as to permit easy kills. Back in 922 BC, thousands of alligators were seen in China along the Yangtze River, and they were still extremely numerous as recently as the Ming Dynasty (1368-1644).

Morelet's crocodiles (*Crocodylus moreletii*) near Belize City, gharials (*Gavialis gangeticus*) across the north of India, as well as saltwater crocodiles (*Crocodylus porosus*), Nile crocodiles (*Crocodylus niloticus*) and American alligators (*Alligator mississippiensis*) were all reported to be abundant in the past, and easily sighted.

Many species used to have broader ranges than they have today, including Cuban crocodiles (*Crocodylus rhombifer*) that could be found not only on the island of Cuba but other Caribbean islands during the Pleistocene, as well as the tomistoma or false gharial (*Tomistoma schlegelii*), which probably disappeared from southern China about 1000 years ago.



Nile crocodiles had disappeared from the Nile delta by the early 1800s, but remained numerous elsewhere in parts of Africa. Changing temperatures and shifts in sea level resulting from climatic events such as the spread of ice sheets elsewhere on the planet almost certainly contributed to the range contractions of species such as the Cuban crocodile. For others, factors such as the much more recent conversion of wetland habitats for agricultural purposes marked the beginning of serious conservation problems.

Recent impacts on populations

Dam construction – which is often seen as a very recent issue for wildlife conservation – was instrumental in starting the decimation of gharials. In the Indus River within what is now Pakistan, construction of dams effectively cut-off the movement of gharials within the river, restricting them to small pockets of habitat, concentrating the population into smaller groups. This factor, combining with intensive hunting in the late 1800s and early 1900s, led to their decimation.

Although crocodilians have been killed by humans for many thousands

▲ Irregular rainfall patterns and water shortages today are impacting on wildlife. Here two impalas - a type of antelope - are drawn to drink in a very small channel of water where a crocodile is lurking, and they were lucky to escape alive and uninjured from the encounter. Photo courtesy Robert Mwaieteleke/www.shutterstock.com



▲ Some crocodiles are to be found in brackish and even saltwater, as shown by this American crocodile swimming in the sea at Banco Chinchorro reef, off the coast of Mexico.

Photo courtesy Alexander Machulskiy/www.shutterstock.com



▲ Massive numbers of crocodilians were being slaughtered for the leather trade, to make items such as bags and shoes. Now this trade is tightly regulated, and crocodile farms have sprung up in countries such as Zimbabwe to meet the demand, without affecting wild populations. The resulting skins also tend to be of better quality than those obtained from wild crocodilians.

Photo courtesy Russamee/www.shutterstock.com

■ Total protection: where crocodilians are strictly protected by law. This was the initial method, and in some countries, it remains the only conservation measure for crocodilians, even though enforcement of these laws can often be almost non-existent.

■ Controlled trade: restriction of the trade in crocodilians and their parts is an effective tool, especially when supported by national laws and international regulation. It allows wildlife resources to be utilised but in a controlled way, with sustainable use schemes being supported by trade controls, and brings local economic benefits to people in such areas, encouraging them to see a value in protecting wildlife.

■ Protected areas: these are localities that incorporate crocodile habitat, where the land itself is protected. In such cases, tourists hopefully are drawn to visit such parks specifically to see wild crocodiles, as well as other wildlife.

■ Captive-breeding: crocodilians bred in captivity are kept in zoos, so people can see them, and also can be used for potential reintroduction programmes.

■ Education: crocodilians deserve respect not just because they are incredible survivors with complex biology, but because they are large and potentially dangerous. People who live in areas which are also

of years, this was very localised – either as a way of feeding or protecting the hunter’s immediate family. It was only when the demand for crocodilian skins for the leather trade became widespread during the late 1800s that the situation really began to worsen for this group of reptiles.

By the 1960s, many larger species of crocodilian were becoming difficult to locate, and hunting turned to the smaller, less valuable species. An example of the extent of this trade at that stage is revealed by trade data from a single state in Brazil between 1950 and 1965. This reveals that 7,517,226 skins were exported from Amazonas, most of which were presumably would have been black caiman, (*Melanosuchus niger*), with the remainder being of the spectacled caiman (*Caiman crocodilus*). As another example, within the US state of Louisiana, some 3-3.5 million American alligators were killed in 50 years from 1880–1933.

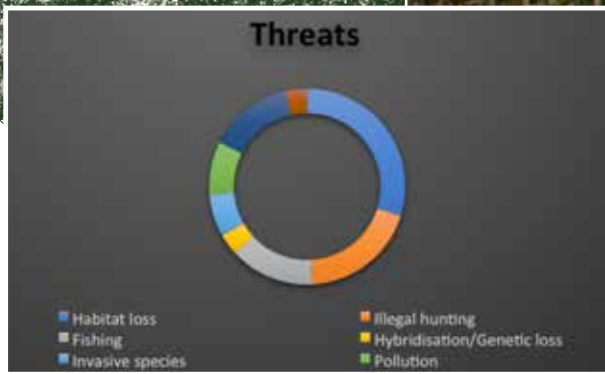
What can be done?

Conservation today is much more about management – of the wildlife and environment. It is rightly recognised that protecting the

biodiversity of the planet is crucial, not just for endangered species but for the entire ecosystem and our very own survival. It means that, wherever possible, ecosystem protection must remain the priority. Where development occurs, it should ideally be carried out with a view to maintaining the biodiversity of the area under development. While business will press hard for fewer environmental restrictions, these arguments are getting difficult to justify.

As storms become both less predictable and more frequent, with crops failing increasingly because of lack of rain, and as regions became less stable due to unnatural water flow patterns caused by poor development decisions that divert, block or otherwise restrict the flow of river or rain waters along their natural path, the economic cost of overexploitation of the natural world is beginning to hit home.

Wildlife management can work at several levels, considering the situation with crocodilians today, with the following options all being available:



▲ The major threats that crocodilians face worldwide today, and their individual significance, is shown in this chart.

Image courtesy of the author

home to large crocodilians need to learn how they can co-exist safely with these animals in the modern world.

By the mid-1970s, international regulations - notably the Convention on International Trade in Endangered Species of Wild Fauna and Flora, better known simply as CITES - were established to stop the illegal trade in wildlife, with the aim of giving populations a chance to recover, when coupled with enforcement of local wildlife legislation.

However, although international trade was largely restricted, illegal trade was almost impossible to regulate in some areas, particularly in parts of South America with its large caiman population. It has been estimated that throughout the 1980s, at least one million caimans were being killed annually, with no more than 20% of the reported trade being legal.

Environmental effects

As in the case of most wildlife on the planet, the depletion of resources and the demand for more by humans is the driver of habitat loss, destruction and degradation that threatens



today's living crocodilians.

The destruction and loss of habitat comes in many forms, including outright loss of habitat due to agriculture, cities and towns, and roads for example. It also is caused by the removal of forest resources

▲ In certain cases, development increases the danger of crocodilian attacks on people. This sign, warning of the presence of crocodiles, is at the edge of an artificial pond created on the Batu Putih Palm Oil Estate in Malaysia's Sandakan District. Crocodiles are now living in this small lake, representing a potential danger for those working on the estate.

Photo courtesy Use Aranas/
www.shutterstock.com

through activities such as logging, gold mining, sand-mining in India, and the conversion of peat swamp forests for palm oil plantations – which is now a serious threat to the

tomiso. Some of these practices also cause pollution. The mercury used in gold mining enters the water, and works up through the food chain to crocodilians, which are the apex predators. Chemical run-off from agricultural lands can have more direct impacts, both in terms of possible toxicity and adversely affecting the water chemistry.

Clearing forests for logging purposes can in turn result in soil run-off and silt accumulating in and modifying the crocodilians' habitat. This may also reduce the availability of prey for them as well, lessening the number of individuals that the habitat can sustain.

As with many deleterious activities, the impacts tend to be both cumulative and complex. Loss of peat swamp forest may provide a short-term economic windfall, but will result in an immediate degradation of



▲ Fertiliser run-off can affect the vegetation in the waters occupied by crocodilians, impacting both on their habitat and hunting opportunities, particularly as the fish population is likely to be impacted as well. An American alligator is shown here. Photo courtesy SandraG/www.shutterstock.com



caimans and American crocodiles (*Crocodylus acutus*) have become regular victims of collisions with vehicles in Brazil and Florida respectively, as are mugger crocodiles (*Crocodylus palustris*) in India.

Major roads are also notorious factors in dividing and isolating wildlife populations. When highways become impassable barriers, small populations of a species become separated and can no longer move easily between areas. This is what is described as fragmentation of habitat and of wildlife populations.

Dams and barrages stop movements of aquatic species, limiting the range of that population. If the species needs to migrate for breeding, or to reach feeding sites at certain times of the year and can no longer do so, it will rapidly become endangered. These structures also reduce water flows, sometimes down to a trickle.

On the other hand, such obstructions can also increase water levels more rapidly than would normally occur, at times when water is released from the barriers. Gharials are sometimes victims of such events, as nesting and basking beaches are washed away, nests are flooded and young individuals can be washed away further downstream where the habitat may not be suitable for them.

With availability of fresh water set to become a key factor for humans over the coming decades as climate change makes rainfalls more unpredictable, management of river systems will be under much greater pressure to ensure sustainable water flows for farming and for towns and cities. Canals, water extraction facilities, plus plans already under discussion in India to link river systems means that wildlife such as crocodilians will be severely impacted.



▲ Tourists will be drawn to areas where they can see these magnificent reptiles close-up, as has been shown in parts of America, especially with alligators, and in Australia too. Ecotourism therefore helps to preserve the habitat of the crocodilians for other species too.

Photo courtesy Deborah Ferrin/www.shutterstock.com



▲ Changes in water flow and currents caused by dams have adversely impacted on gharial numbers - and those of other crocodilians too.

Photo courtesy Arsgera/www.shutterstock.com

▲ Increasing numbers of crocodilians are being hit and killed on roads, as urbanisation pushes deeper into their habitat. Photo courtesy MarynaG/www.shutterstock.com

habitat, and a loss of many species.

The impacts are wider still of course, with burning of peat swamps releasing significant greenhouse gases into the atmosphere. This also reduces the planet's ability to lock up some of the carbon, preventing it from getting into the atmosphere and contributing to global warming

(which is a vital benefit of peat swamp forests, as they retain this carbon).

The impact of development

Construction of roads not only opens up forests to further exploitation, but also introduces a new threat to susceptible wildlife: roadkill. Dwarf



Current status of the world's crocodilians

Twelve crocodilian species are now currently considered Lower Risk by the IUCN's Red List of threatened species, as shown below. Seven species, however, are defined as critically endangered and four as vulnerable. There is not enough data on the other two to classify them, but clearly, this absence of knowledge suggests a shortage of numbers making up the population, and is not encouraging.

▲ **Illegal widespread killing of caimans in South America for the international leather trade was an issue which has now been tackled, thanks to improved protective measures and international regulations.**

Photo courtesy Vaclav Sebek/
www.shutterstock.com



▲ **The West African slender-snouted crocodile (*Mecistops cataphractus*) is a fish-eating species, about which very little is known, and its current population numbers in the wild are unclear. This has meant that it is impossible to assess its status officially, although most experts believe that the species is now seriously endangered.**

Photo courtesy Bappa Pabitra/www.shutterstock.com

Species	Status
Chinese alligator	CR
Philippine crocodile	CR
Orinoco crocodile	CR
Siamese crocodile	CR
Gharial	CR
Cuban crocodile	CR
African slender-snouted crocodile	CR
Tomistoma	VU
American crocodile	VU
Mugger crocodile	VU
Dwarf crocodile*	VU
American alligator	LR/LC
Australian freshwater crocodile	LR/LC
Nile crocodile	LR/LC
New Guinea freshwater crocodile	LR/LC
Saltwater crocodile	LR/LC
Spectacled caiman	LR/LC
Broad-snouted caiman	LR/LC
Yacare caiman	LR/LC
Dwarf caiman	LR/LC
Smooth-fronted caiman	LR/LC
Morelet's crocodile	LR/LC
Black caiman	LR/CD
West African crocodile	Not assessed
Central African slender-snouted crocodile	Not assessed

Chart courtesy of the author



The comeback kings!

In areas which are politically stable and have good law-enforcement, species have generally been able to bounce back from hunting pressures once they are protected, as long as sufficient habitat is still available. Both the saltwater crocodile and its freshwater cousin (*Crocodylus johnstoni*) in northern Australia, as well as American alligators in the south-eastern USA are examples in this group.

'Saltie' numbers had fallen to estimates of around 500 adults by the

1970s, after decades of hunting, but they are now considered to have recovered to their previous level, with the Australian population now probably exceeding 100,000 adults. American alligators are estimated to number between 3-4 million individuals in total across their range.

This comeback has a cost attaching to it, however. As crocodilian populations increase, so do their interactions with people. In the developed world, these usually occur during leisure activities – boating, fishing, swimming – even golf, with

▲ **Moving crocodiles is not really feasible in many parts of their range.** Photo courtesy Volodymyr Burdiak/www.shutterstock.com

alligators being encountered wandering across the links.

In the developing world, however, the activities that bring people into close contact with crocodilians are essential for life. These include collecting water for cooking, cleaning or drinking, washing and bathing, crossing waterways for work, and fishing, both as a livelihood and to obtain food for the family.

Different solutions are therefore required, in order to minimise the risk of conflict. Crocodile management in countries such as Australia focuses on educating people in an area about crocodile behaviour, warning of the danger of venturing too close to the water's edge and swimming. Running alongside the education advice are schemes to manage 'problem' crocodiles.

On-going monitoring

Crocodile attacks are followed up, with the aim being to identify and kill or capture the individuals responsible. This is important, as it has been shown that once crocodilians obtain a taste for human flesh, they will look to prey on people ➤



▲ Finding alligators on the greens can be an issue when playing golf in parts of Florida today. Photo courtesy pixelworlds/www.shutterstock.com

Nile crocodiles have a remarkable memory, when it comes to hunting.

Photo courtesy Dave Montreuil/www.shutterstock.com



again in the future. But the definition of 'problem crocodiles' is more wide-ranging, attempting to minimise the rise of conflicts in the first instance.

Significant numbers of animals are being removed from waterways frequented by people in both the USA and Australia, with around 300 crocodiles being translocated each year from the waters of Darwin Harbour and its surrounds. Education programmes coupled with removal of potentially dangerous crocodiles is generally enough to keep the peace.

Yet this approach is really not adequate in the developing world, where the risk of conflicts are potentially higher, because of people's lifestyles, and resources are scarcer. Increasing crocodilian populations there may be good news for conservation, but not necessarily for local people. They still have to rely on visits to local rivers and lakes for their daily fresh water needs, meaning that they are then more vulnerable to attack by crocodiles, simply because there are more of them there.

Education programmes may help a



little; removal of problem crocodiles occasionally occurs, but it isn't very consistent or effective. In many of these areas, the problem is actually nothing to do with crocodiles: it's purely a socio-economic issue. What that means is the solution is to help the local people with livelihood options and improved infrastructure – even putting in a water pump away from the river can reduce encounters and conflict with crocodiles.

▲ Crocodilians are masters of disguise, as illustrated by this photograph of the remote Daly River, which lies in Australia's Northern Territory. It's always the ones that you can't see that you need to worry about!

Photo courtesy EA Given/
www.shutterstock.com

A supremely adapted predator

No other animal is better adapted to being an ambush predator in the shallows than a crocodilian. They are ideally suited to this role, thanks to their unique anatomy, and what is interesting is that the typical appearance of a crocodilian has altered remarkably little in general terms, extending right back to the age of the dinosaurs and earlier.

Crocodilians have all their main



senses aligned with the water's surface. The eyes, ears and nose project just above the surface: they can see, hear, smell and breathe from that position. The eyes are able to focus on a horizontal section of the river bank with just tiny adjustments of the eye, rather than requiring elaborate head movements, which would be much more likely to alert prey to the fact that a crocodile was close-by.

Their ears can localise sounds very well, and at the same time, delicate sense organs line the jaws. These are known as integumentary sense organs (ISOs), and will detect any movement or disturbance at the surface of the water near the crocodilian.

Most animals have cryptic patterning or colouration that can serve as camouflage, and crocodiles are no exception, blending in very effectively when submerged. So, in a low position, with almost its entire body hidden beneath the surface (and totally concealed in murky river water), a crocodile is extremely difficult to spot.

It, however, has a very clear picture



▲ **Crocodiles reveal very little of themselves at the water's surface, but will still have a clear view of the world around them, as shown by this American alligator.**

Photo courtesy Katie May Boyle/www.shutterstock.com

of the area surrounding itself, with all its senses relaying information to its brain. The ability of crocodilians to hunt depends on them being able to remain out of sight, and they are supremely equipped so to do!

If a crocodilian detect a wary prey animal, it can even submerge back just below the surface. Here it will be totally invisible, but will still have ample sensory feedback, enabling it to move closer without alerting its target to the impending danger.

Staying submerged is not a problem. Large crocodiles have been known to remain underwater for over seven hours: the most complex heart and circulation of any vertebrate animal makes this possible.

Misunderstood but still deadly

For many years, it used to be thought that crocodilians, as cold-blooded reptiles, were dim-witted. Now we know this is definitely not the case! They have a remarkable capacity to

learn, observing their environment and noting patterns of behaviour in their prey.

This then allows them to select the ideal location, position and the most favourable time for a successful hunt. Those Nile crocodiles in Africa don't just hang around hoping that a wildebeest will wander past: they know when to expect the migration, as well as where the animals are likely to cross the river, and will be most vulnerable.

So, here is a group of predators that are able to judge where to wait, along with the anatomy and physiology to lurk unseen. They are also deadly when they do strike. It's no wonder that they are such successful predators!

The jaws and teeth of crocodylians are designed for one simple task: gripping on to prey and not letting go. The teeth are conical, pointed (and very sharp in young crocodylians, although less so in older individuals). They are replaced regularly, as they become worn or damaged. The larger teeth are located on top of the gentle undulations of the jawline, providing a better grip.

The power that a crocodylian's jaws can exert is phenomenal: almost 30 newtons per sq millimetre (equivalent to two tons per square inch) of force, and over 1389 newtons (90 tons) of point pressure at the tips of some of those teeth. Whatever they bite, the teeth are going to penetrate and anchor into it without any problem.

Critically, that jaw strength allows these reptiles to grip even quite large prey, and drag it into the water. If a crocodylian feels resistance from its quarry, however, then it simply rolls on its own axis to tilt the unfortunate animal off balance, which then makes it easier to pull down beneath the surface.

When a crocodylian lunges at a target out of the water, the movement is simple: push off from the legs and sweep the tail at the same time. Its momentum will carry it a short distance further too, and smaller individuals can run a few more steps, but crocodylians are essentially water's edge predators.



◀ In Australia, warning signs like this are common in areas which crocodiles are known to frequent.

Photo courtesy Shade design/www.shutterstock.com



▲ A crocodile's formidable teeth exert remarkable pressure. There are also sensors in the jawline, which help them to determine the position of their prey. Photo courtesy Enrique Ramos/www.shutterstock.com

Key safety rules

As this indicates, there is enough information here to keep anyone safe from an attack by any crocodylian: simply stay away from the water's edge! In crocodile country, if you don't need to go near the water, you don't...

Don't look for crocodiles, thinking you'll spot them: the dangerous ones are the ones you can't (and won't) see!

On the other hand, don't believe the ridiculous story that crocodylians can run as fast as horses, or indeed, the strange belief that they can in a zig-zag fashion. In order to stay safe, all you need to do is simply stay away from the water's edge - and don't forget this advice when pitching a tent as well!

In some developing countries, so as to give local people safe access to





The formidable saltwater crocodile is the most deadly species as far as people are concerned, based on CrocBITE's figures. Photo courtesy sushi kumudini chikane/www.shutterstock.com



◀ In spite of popular belief, the majority of crocodilian species do not represent any danger to people. This is the smallest species, known as the African dwarf crocodile (*Osteolaemus tetraspis*), which typically grows no bigger than 1.5m (4.9ft) overall. Its diet is based on fish, crabs and other small prey. Photo courtesy Milan Zygmont/www.shutterstock.com

the water, there may be crocodile exclusion enclosures. These are basically cages that the people go into, which crocodilians cannot enter. The cage is positioned at the edge of the water, and aims to allow people to bathe, wash or collect water whilst remaining barricaded away from any crocodilians nearby. As long as the enclosure is adequately maintained, this approach does work very well.

The main culprits

Figures compiled since the year 2000 show that of 3748 incidents recorded in the CrocBITE database (at www.crocodile-attack.info which monitors attacks by crocodilians on people), there were 1538 carried out by saltwater crocodiles, 1061 by Nile crocodiles, 454 by mugger crocodiles, 226 by American crocodiles and 181 by American alligators. A further two species - Morelet's crocodile and tomistoma - together accounted for 80 and 31 incidents respectively. ▶



▲ The tomistoma - also sometimes referred to as the Malayan gharial - grows to a large size, and does attack people, although in the past, it was thought to be a harmless fish-eating species. Photo courtesy BLUR LIFE 1975/www.shutterstock.com

That's just seven species implicated, out of 25 officially-recognised species, being equivalent to less than a third of the total. The others tend to be either too small or possibly too rare to cause any significant problems with people. The facts are very different from the perceived popular image of crocodilians generally being 'man-eaters'.

It may be a surprise to some readers to see tomistoma appear on the above list, given that this species had the reputation of being a fish-eater for decades. The truth is different: in the wild, primates and other mammals are now known to form a significant part of tomistoma's diet.

Tomistoma can attain truly giant sizes, and a 4.5m (14.75ft) male can easily overpower a human. If tomistoma populations continue to recover in their habitats within Malaysia and Indonesia, it is likely that there will be an increasing number of attacks on people by this species in future, so care needs to be taken.

Living in harmony

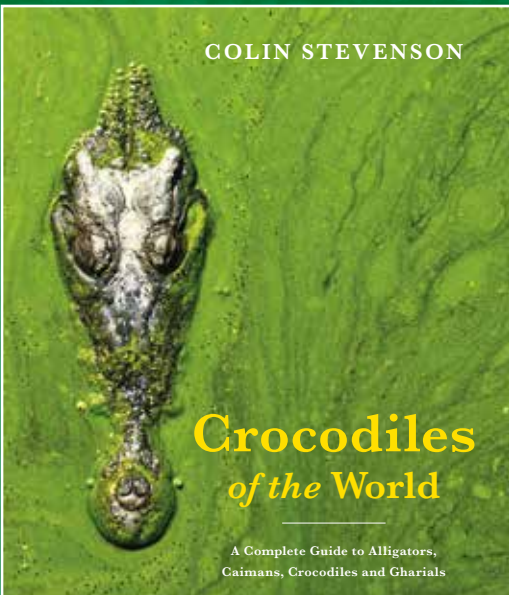
Although incidents with crocodilians appear to be increasing, people living in areas where these reptiles occur have always had to contend with these formidable predators. As

populations recover in many areas, crocodilians are now reclaiming lost habitat as they expand back into areas from where they were eliminated. This in turn means that several generations of humans who have never had to deal with the risk of crocodilian attacks now suddenly find themselves facing this changed scenario.

Key to this is the fact that all crocodilians today are water's edge, water's surface predators. In the developing nations, political will needs to be brought to bear, in order to ensure that riverside communities have better living conditions that reduce the need to loiter at the edge of the water. It is especially dangerous to crouch down here, as this presents a smaller and more attractive target for crocodilians in the vicinity.

Crocodiles will continue doing what they have done so successfully for so long: survive. We need to adapt our own lifestyles around a more sustainable model so we too can survive alongside them, in areas where people and crocodiles co-exist. Knowledge, tolerance and basic infrastructure improvements can significantly reduce the danger posed by these magnificent reptiles, thereby allowing us to live together in relative harmony. ❖

Colins book



Crocodiles
of the World

A Complete Guide to Alligators,
Caimans, Crocodiles and Gharials

* Colin Stevenson has had a lifetime fascination with crocodiles and is a member of the IUCN/SSC Crocodile Specialist Group, as well as the IUCN Commission on Education and Communication. He is heavily involved in dedicated task forces for endangered crocodilian species, has worked with crocs in Australia, India, Brazil and the UK, and has also authored many papers on crocodile conservation and behaviour. His latest book, entitled *Crocodiles of the World*, has recently been published by New Holland at £16.99.