CONSERVATION: The Mary River Turtle Story

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"Because they are still living, turtles are commonplace objects to us; were they entirely extinct, their shells - the most remarkable defensive armour ever assumed by a tetrapod- would be a cause for wonder".
(Alfred Sherwood Romer)

INTRODUCTION

Turtles first appeared approximately 200 million years ago in the Permian wetlands and have been able to adapt to many different changes and environs, including saltwater and freshwater habitats (flowing and still), annual freezing, the drying up of water due to climatic changes and drought, and more recently, global warming.

Freshwater turtles are divided into two sub-orders, the first being Pleurodire, comprising of all Australian turtles excluding the Pig-nosed turtle, as well as the species endemic to New Guinea and South America. These are also referred to as side-necked turtles. The other sub-order being Cryptodire, which includes species in North America and Asia. The species in this sub-order pull their head and neck backwards, on a vertical plane, into their shells.

Common Australian Pleurodiran turtles may have an advantage over the Cryptodiran species. They do not rely on temperature dependent sex determination, so this may make them less susceptible to climate change.

Freshwater turtles can also be grouped by their preferred habitat type. There are river specialists that have adaptations to their morphology and diet that help them to survive in often fast flowing water. River specialists usually avoid leaving the water for any reason other than to bask or lay eggs. There are also 'habitat generalists' that are happy to live in just about any aquatic, freshwater environment. These generalists are extremely resilient to change and will often give the false impression that a river system is healthy by being present in large numbers. They are also comfortable travelling long distances over land in search of better living conditions.

Turtles are now being recognised as indicators of environmental health. Several Australian species utilise cloacal respiration, that is, absorbing oxygen directly from the water via highly vascularised membranes within the cloaca, called bursae. Bursae function exactly like gills and therefore bimodal breathing

turtles have a very low tolerance to fluctuations in water chemistry, pollution and salinity.

Most people can associate with turtles, and as children are fascinated by them. They are appealing to all ages and are commonly the first reptile acquired by new enthusiasts. Our fascination with turtles started as children and has developed over decades of private keeping into an obsession as we have learnt to appreciate their value and importance as environmental indicators. Our goal is to ensure that they will be able to survive for future generations to enjoy!

All around the world, including our own country, freshwater turtles are in trouble! The less famous and less charismatic freshwater cousins of the marine giants are suffering at the hands of the most destructive species of all time – humankind. Their habitat is being degraded, destroyed and lost through development and the introduction of non-native species of animals and plants. Their populations are becoming fragmented through the construction of dams and weirs, their reproductive success limited by livestock and feral pests and in the past they have been over exploited and harvested.

Additionally, there is a lot of crucial information and understanding that is lacking when it comes to freshwater turtles in the wild. Population surveys, viability analysis, biology and behavioural studies are data deficient. Conservationists, scientists and community groups need to be encouraged to start spending more time and money determining and understanding how these threats affect the survivorship of each and every species, before it is too late. We cannot conserve or protect anything if we don't understand it!

Unfortunately, humans have played a major role in creating all of the recognised threats to turtles. If we don't change our behaviour and start to appreciate the true consequences of our actions, the plight of Australian turtles is looking very grim indeed.

THE MARY RIVER TURTLE STORY –CHAPTER 1- THE THREE JOHN'S.

The Mary River turtle, *Elusor macrurus,* was described by John Cann and John Legler in 1994. They are a monotypic species and are from one of the oldest lineages in Australia. John Cann, a freshwater turtle expert, commenced searching for the locality of this elusive species in the early sixties after noticing an unusual looking turtle for sale in pet shops in Sydney. The Mary River turtle hatchlings were sold in numerous pet shops in the early sixties through to 1974 when they started being phased out due to changing native wildlife laws and pet shop regulations. Most pet shop owners referred to them as 'Saw-shelled snappers' but John knew that this was

incorrect. It has been conservatively estimated that over 100,000 eggs were taken from the wild, incubated and distributed in large numbers to pet shops in Queensland, New South Wales, Victoria and South Australia. This 'stolen' generation was thought to be lost from the gene pool forever....until recently!

John Cann was led on many a 'wild goose chase' travelling thousands of kilometres around Australia, and even as far a field as New Guinea searching for this unusual looking species that was affectionately known as 'The Pet Shoppe Turtle'.

After over a quarter of a century of dogged determination and detective work by John Cann, his tenacity finally paid off in 1990. The very person that had been collecting the eggs from the nesting banks of the Mary River, a man named John Greenhalgh from Maryborough, finally 'came clean' and revealed to John Cann where the specimens originated. After many hours of unsuccessfully diving and trapping in the 'Mary' John Cann saw some turtles basking on a log. He grabbed some binoculars and finally his search was over! As the name suggests, Mary River turtles are endemic exclusively to the Mary River, Queensland.

"Rarity is a precursor to Extinction"
(Charles Darwin)

THE MARY RIVER TURTLE STORY – CHAPTER 2 - CONSERVATION

The Mary River turtle is listed as endangered by the Queensland State Government, the Australian Federal Government and Internationally. They are listed in the top 25 most endangered turtle species of the world. The Mary River turtle is a river specialist and therefore does not adapt well to changes to the river environment.

The Mary River turtle takes 15 to 20 years to reach sexual maturity. They are thought to be long-lived and presumably live to well over 100 years, although exact life expectancy is unknown.

It is believed that the Mary River turtles in the lower catchment have been experiencing zero recruitment for at least the past 7 years When a population is ageing and no juveniles are reaching maturity to replace aged, non-breeding animals, this is known as 'zero recruitment'. This is obviously not sustainable and indicates a population is on the downward spiral toward extinction unless there is some form of intervention. This has prompted the state Government's Environmental Protection Agency to start formulating a Species Recovery Plan.

Threats specific to Mary River turtles include habitat degradation, population fragmentation by water infrastructure,

mortality from feral and native predators and trampling of ancestral nesting banks by livestock and feral hoof stock. In the lower catchment of the Mary River, this turtle has not recovered from over harvesting for the pet trade. Additionally, it has a limited distribution and specialised ecology and morphology; traits that make any species very vulnerable to environmental changes.

Habitat is degraded by the alteration of the vegetation along the river bank (riparian zone) and riverine ecosystem to accommodate grazing and stock watering. Increased nutrient levels from pasture run-off and treated effluent discharges, as well as the invasion of introduced plant species, both aquatic and terrestrial, all contribute to habitat degradation.

Chemical and heavy metal pollution suppresses the immune systems of turtles as well. Being bimodal breathers, the Mary River turtle is extremely vulnerable to chemical pollution. With its limited distribution, there is always the possibility that one severe chemical spill in the upper reaches of the river could annihilate them completely.

As recently as the year 2000, Mary River turtles were only thought to occur in the lower catchment of the Mary River and there was only anecdotal evidence for the upper reaches.

We have actually found that they are most prevalent in the upper catchment and that the lower catchment no longer supports their preferred habitat structure. In fact, the upper reaches of the river are still quite intact as far as habitat and riparian vegetation are concerned and is the most sustainable habitat available to them.

We have identified a formula that we recognise as ideal preferred habitat. This involves the combination of sand banks, riffles and deep pools containing heavy log cover. After sampling 63 kms of the river by canoeing and snorkelling, this formula was duplicated a minimum of 15 times. Another observation was the high number of juveniles between two and six years of age that clearly outnumbered the adults.

GENERAL CONSERVATION PRINCIPLES

There are many techniques employed for species conservation that are divided into two distinct categories. **Traditional Resource management** involves a heavy reliance on manipulation of species and their habitats. This often changes the habitat to benefit specific, ‘targeted’ species sometimes disregarding the effects of these changes on non-target species. Controlling predators and feral pests, planting specific crops, removing undesirable plants and increasing population sizes through captive breeding and head-starting are all traditional methods.

The second and more modern category is **Conservation Biology** which involves a more holistic approach. This involves the more complex methodology of monitoring and maintaining a functional ecosystem, studying and understanding ecosystem processes and maintaining sustainable populations of target and non-target species.

All of these techniques if combined will succeed. If the traditional approach, however, is taken without looking at the 'big picture', then success will be limited and we will continue to lose more ground than we gain.

Unfortunately, the most commonly used techniques in Australia are the ones that have the least long-term success at the highest cost, financially and environmentally. Employing techniques such as constructing a hatchery have the appearance of getting animals back into the wild, look fantastic (particularly in the eyes of the general public and the media) but really does very little for the actual species' long-term survival. This is nothing more than a band-aid solution!

For example:
The Queensland State Government has spent $1.1m setting up a hatchery for the Southern Snapping Turtle *Elseya albagula* in the Burnett River, plus has allocated $400,000 per year to run it. This hatchery collects wild, gravid females from 'healthier' sections of the river and places them in contained areas, hoping that they will nest on man-made nesting banks. The eggs are then gathered and incubated, and the females released back into the wild. Not all gravid females find these conditions favourable and drop their eggs in the water and devour them. This further loss of hatchlings places even more pressure on the wild population.

This exorbitant sum of money would have much better been allocated to nest protection, predator control, habitat restoration and designing a turtle barrier to prevent overtopping at dam and weir walls. The money could also have been invested into the research and design of a 'turtle way' (similar concept to fishway) to allow upstream and downstream movement around dam and weir walls to prevent fragmentation of the population. Identifying and resolving these real threats to their survival, and maintaining a viable population and ecosystem would be much better for their long-term survivorship!

The State Government has guaranteed funding for five years but what then? The species is left to fend for itself in substandard habitat and the population is fragmented by concrete barriers.

For a start this does absolutely nothing to mitigate the deaths and injuries to adults resulting from the water infrastructure that has been scattered throughout their habitat. It has been proven that

adults that have sustained non-fatal injuries in dam and weir catchments can be not reproductive for up to two years. The resulting losses to the population are not sustainable by any means.

In a lot of ways hatcheries alone are nothing more than propaganda and sensationalism and is perceived by the general public as the Government 'achieving conservation' by saying they are releasing x number of hatchlings per year. These are only half truths that do not explain that they are eggs removed from gravid, wild animals and that more would have hatched out through nest protection and predator control than in a hatchery. In addition to this, gravid turtles prefer solitude and the stress of being placed into a hatchery, in such large numbers may trigger them to abort their eggs in the water.

A combination of long-term monitoring and habitat management field work is the most effective strategy for species conservation. Understanding all aspects of a species and its ecosystem is crucial to instigating any successful conservation strategy and minimising impact on other, non-target species.

The problems that have caused the decline of the species need to be addressed as another priority. Increasing the number of juveniles by lowering the mortality of the young, but ignoring a high mortality in adults is changing the life history pattern of the species and essentially reversing evolution!

AFTCRA'S CONSERVATION EFFORTS FOR MARY RIVER TURTLES

AFTCRA Inc. is the first conservation based reptile association in Australia and was founded in July 2005. We are also the first association in the world to concentrate exclusively on freshwater turtles! Our mission is to protect all freshwater turtle species and to prevent extinction by ensuring sustainable populations can and do exist in the wild. We hope to accomplish this by obtaining data for unfamiliar species, completing population viability analyses, liaising with government agencies and community groups and contributing to recovery and management plans. We will endeavour to establish education centres and run workshops and stalls to educate the general public in sustainable farming and river use and responsible use of water resources. Further to this, encouraging local communities and landholders to engage in our projects will hopefully empower people to take ownership and some responsibility for their local environment. We are only able to do this by utilising membership fees, generous donations from the public and profits from merchandise. We rely very little upon government contributions to achieve our goals as local funding bodies appear to favour the 'quick-fix', traditional strategies and not the long-term monitoring and management principles.

Our current members consist mainly of scientists, veterinarians, freshwater turtle enthusiasts and world leaders in turtle husbandry and conservation. We encourage membership to anyone who has an interest in wildlife, conservation or environmental issues. Members are not obliged to volunteer for us, however becoming involved in field surveys is fun, enlightening and fantastic practical experience.

AFTCRA Inc. is taking a more holistic approach to conservation of the Mary River turtle. We initially decided to concentrate on them as a species because they are considered Australia's second most endangered turtle and are relatively unknown to science with very little data being available. In addition to this, Mary River turtles are incredibly difficult to locate and can only be caught by hand using skilled divers. They refuse to enter traps, and nets have limited success because of the amount of log cover in their preferred habitat areas. The scientific name *Elusor macrurus* literally translates to elusive, large-tail.

WILL THIS LATEST THREAT SEAL THEIR FATE?

There is now the very real threat of a mega-dam being built in the mid-catchment of the Mary River. The dam footprint is expected to be 1.3 times the size of Sydney Harbour! Thirteen of the fifteen ideal habitat sites, mentioned previously, will be destroyed if this proposal is approved, which accounts for approximately 86% of their known preferred habitat! Inundating these areas will permanently alter the natural formula essential for the survival of this unique species.

Since we initiated our preliminary investigations we have been working to understand how the population is structured and why the population in the lower reaches is struggling so much. For Mary River turtles, there is more recruitment in the upper reaches than in the lower reaches and for this reason we find it difficult to understand that funding bodies prefer to channel funds into protecting nests in a seemingly unsustainable area when the viability of the species population as a whole, is not understood. The animals in the lower catchment may well be a living-dead population due to the lack of suitable habitat.

In the past six months we have attended several training camps to ensure our methodologies are consistent with the Queensland Environmental Protection Agency's Turtle Conservation Project (EPA/TCP). We have been provided with foot-tags to allow identification of individuals as well as 'notch codes' as a secondary identification measure. To date, we have marked 59 Mary River

turtles from just one of the ideal pools we identified in our preliminary study, comprising 64 percent juveniles and sub-adults.

Outside of AFTCRA Inc., we have been breeding Mary River turtles as a hobby since 1996. Most of the animals in our collection were unwanted pets from the days of the pet shop industry selling Mary River turtles. Some of our adults were also found occurring in areas of Sydney and placed into captivity as they are not endemic to the area. In previous years, our hatchlings had stayed in captivity, providing keepers with much loved pets.

We offered these hatchlings to the EPA/TCP Project Officer for release into the wild as a gesture of our commitment to conservation. To our surprise, after five months of trying to persuade authorities and ethics committees, we were given the go ahead to release the turtles into a designated location in the Mary River. This site was chosen as being the best possible site for survivorship and is in an area that will not be impacted by the proposed dam.

The extreme importance of these hatchlings to conservation cannot be over emphasised! The parents of these animals were believed to be lost from the wild gene pool forever as they were from the 'stolen generation'.

On 16th February and 16th March 2007, we released a total of 106 captive bred hatchlings. All of the turtles released were notched with specific codes to ensure future identification as well as to allow for recapture data that will provide information on growth rates, movements and seasonal behaviour patterns. We sincerely hope that we can eventually identify one of our females contributing to the breeding population of Mary River turtles in the wild.

Our breeding success was increased by altering the landscape in and around the dam to replicate their ideal natural habitat. Additionally, we siphoned water from another dam located above to supplement in-flows of freshwater, as the current drought in our area did not provide the necessary environmental cues for Mary River turtles to breed.

CONCLUSION

Freshwater turtles are declining all over the world. The threats to their survival are primarily the results of poor decision making by past governments and a lack of understanding of their biology, ecology and environment.

To be successful in any conservation initiative, we need to utilise the full range of strategies and not show any bias towards the 'quick fix', media friendly short-term measures.

Mary River turtles need our intervention to ensure they survive for future generations but it is essential to understand their habits, ecosystem and population structure first.

AFTCRA's preliminary findings are looking very positive for the Mary River turtle. Although our survey is in its early stages, there is a strong indication that the Mary River turtle population is stable and sustainable in the upper catchment providing there are no serious changes that will impact upon the river ecosystem and riparian zones.

If the Queensland State government receives federal approval for the mega-dam on the Mary River, this may well be the catalyst that sends the Mary River turtle to extinction as its stronghold is presently the prime habitat within the upper reaches of the Mary River, 93% of which will be irreversibly destroyed by this dam!

It is imperative that ALL future dams constructed in any river system be designed to avoid serious injury to freshwater turtles and prevent population fragmentation.

As amateur herpetologists, we are the people who have the most empathy for Australian reptiles. It is our obligation to collectively lead by example and steer humankind in a less selfish direction.

We may be the most destructive species on the planet but we are also the only species that has the power and ability to PREVENT EXTINCTION!

Conservation= unpopular and often controversial decisions on a local, state and federal level, in order to alleviate the threatening factors caused by increasing human population and destructive social behaviours which force other species into decline!
(AFTCRA Inc.)

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