

Frankly, Mary, I Don't Give A Dam(n)

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The story reads like a detective novel, rife with abundant mystery, intrigue, and insidious dealings. The protagonists face trials and tribulations beyond their control and likely to result in dire consequences. The current arch-villain is a dam — and, as yet, the story is without a conclusion.

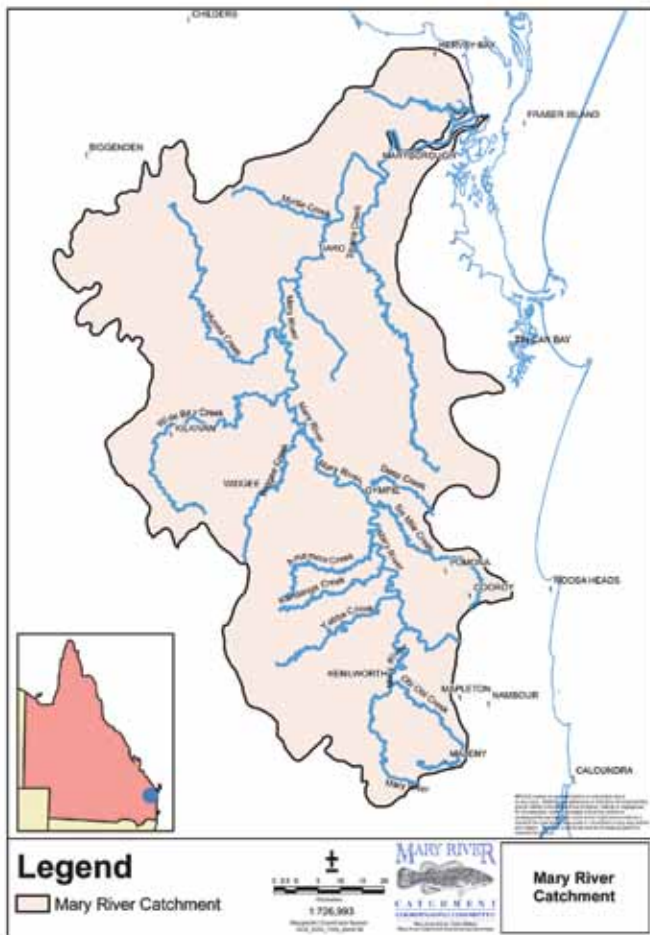
We open in the communities of Kenilworth, Conondale, Jimna, and Amamoor at the headwaters of the Mary River in the Conondale Ranges near Maleny. From there, one has a wonderful view of the 26–27 million-year-old extinct volcanoes that make up the Glasshouse Mountains 70 km northeast of Brisbane. These ancient volcanoes were named by Captain James Cook in 1770 because their shape reminded him of the glasshouses or huge glass furnaces of his native Yorkshire.

Eventually, the Mary empties 307 km downstream into the Great Sandy Straits west of Fraser Island at River Heads (Tiaro



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Evidence of Goanna (*Varanus varius*) predation on a turtle nest.



Map of the Mary River Basin (from Flakus and Connell 2008).

Landcare Group 2008). In Cook's time, the traditional owners of the land were the Kabi Kabi (or Gubbi Gubbi), who lived in the hinterland and on the Sunshine Coast and called the Mary River the Moocooboola, and the Butchulla, who lived on Fraser Island at the mouth of the Mary River, which they called Moonaboola. The river was of great cultural importance to both, and also to other local indigenous groups.

Andrew Petrie and his party rowed up the river in 1842 until rapids near Tiaro blocked their passage. At that point, they renamed it the Wide Bay River (Tiara Landcare Group 2008). In 1847, the Governor of New South Wales (which included Queensland at the time), Charles Augustus FitzRoy, again changed its name, this time to Mary, after his wife, Lady Mary Lennox, who had just died in a carriage accident (Cann 1998).

For many reasons, beyond the naming (and renaming) of its river, this was a land of mysteries, not the least of them being



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Their highly developed sense of smell makes Goannas, such as this Lace Monitor (*Varanus varius*), a major problem on nesting beaches.

the Mary River Turtle (*Elusor macrurus* = the elusive long-tailed escaper), which until recently (relatively speaking) had remained unseen and unknown to the scientific community despite a long presence in pet shops.

Mary River Turtles are Australia's largest freshwater chelonian, growing from 3–4-cm-long hatchlings to animals with a carapace length of 34 cm. These turtles once were a common sight in Australian pet shops in Adelaide, Brisbane, Melbourne, and Sydney. They were sold as “penny turtles,” but their origin was a mystery (Cann 1994).

The species soon attracted the attention of turtler extraordinaire, John Cann, author of the definitive treatise on Australian turtles. Although, strictly speaking, he is considered an amateur, John has a long history of working with museums and academic researchers ranging from Rod Kennett in Darwin to Arthur Georges at Applied Ecology Labs and Ross Sadlier at the Australian Museum. In all likelihood, not a single researcher, private keeper, or museum curator in Australia (and beyond) has failed to benefit from John's knowledge, which he shares quite readily and generously. The Australian Museum in Sydney holds many of his specimens, from which he described the Mary River Turtle (Sadlier 2004) — but that is getting a little ahead of our story.

John spent in excess of 30 years attempting to trace the source of the “penny turtles.” He followed up lead after lead, tracking turtle dealers, suppliers, and eventually learning the name of the mysterious collector, John Greenhalgh of Maryborough, Queensland.

Correspondence with Greenhalgh ultimately led Cann to nesting beaches and localities where collecting had occurred (Cann 1998). Subsequent searches were in vain, but one day a note arrived with information that an adult had been captured. The long drive from Sydney seemed pointless, as Greenhalgh presented him with an *Elseya dentata* — but, after the shock (and joke) had worn off, he was presented with another turtle, this time an adult Mary River Turtle (Flakus and Connell 2008). Subsequent trips to the river finally led him to the habitat that was home to the turtle that Peter Pritchard once jested should be named “*petshopi*” (Pritchard, pers. comm.) — Queensland's Mary River far to the north of Sydney. John ultimately published a formal description with John Legler in 1994 in *Chelonian Conservation and Biology* (Cann and Legler 1994).

The Mary River Turtle is Australia's largest short-necked turtle, and is endemic to the Mary River in southeastern Queensland, the only place in the world where a natural population occurs. Identifying features include a low streamlined shell and a very large tail. The shell (carapace) of a large male can reach 42 cm in length, and tail length can be as much as 70% of the length of the carapace. A female's shell can reach 33 cm. The shell's low profile allows these turtles to swim at astonishing speeds. Mary River Turtles often are observed with only the tips of their snouts protruding above the water's surface. These turtles also can absorb oxygen while submerged via a specialized sac-like cavity (cloacal bursa) at the base of the tail. Due to this unique physiology, they require flowing water to survive. Most of an adult turtle's diet consists of filamentous algae, other plant material, such as roots, stems, and bark of submerged and aquatic plants, and fallen fruit from trees growing along the riverbank. Adults also opportunistically feed on animal matter. Using their claws, they have an amazing ability to open and crush bivalves before swallowing the soft parts and some shell fragments.

In years gone by, the species mass-nested in the hundreds, if not thousands. During the 1960s and 1970s, it mass-nested in the hundreds. Between 1962 and 1974, as many as 15,000 eggs were collected annually. Many of these eggs were incubated and sold through the aquarium trade while it was still legal, hence the “pet shop” turtle.

However, as quickly as the turtle was located and described, it appeared that it would be lost — and it is now considered to be one of the most threatened species of freshwater turtles not just in Australia, but in the world. The turtle's restricted habitat, age at



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Mary River Turtles need sandy river banks to nest.



MARILYN COWNEILL

The senior author checking a Mary River Turtle nesting site.

maturity, predation, flooding, and changes to its habitat combine to threaten its long-term survival.

Years of harvest of the majority of eggs for the pet trade, predation by introduced (e.g., foxes, dogs, and humans) and native predators, such as Goannas (Monitor Lizards in the genus *Varanus*), had taken their toll. These same factors continue to reduce the population, particularly numbers of juveniles. Females do not reach adulthood until they are 15–20 years old. In the 2004–2005 season, only 120 females were known to have laid eggs. Entire cohorts were missing; the majority of individuals were adults and no real recruitment was taking place.

The Mary River Turtle is one of two Australian turtles listed as endangered by the IUCN (IUCN/SSC TFTSG 2008), which simply means that the species has met the criteria to be considered at very high risk of extinction in the wild (IUCN 2000). The species also is included among the 25 most endangered turtles in the world (Turtle Conservation Fund 2003). Although 200 of the world's 300 or so turtles are in trouble, the Mary River Turtle is listed as one of the "Top 25 Turtles On Death Row" (Conservation International 2003).

Unfortunately, efforts to conserve an animal that should be considered a national treasure have been negligible. In the quest to meet Queensland's water needs, an absolutely beautiful landscape is to be submerged — and turtles and dams don't coexist well. Many biological and physical factors ultimately determine which turtle species occur in rivers. Changes in any of these factors can have an immense

impact on species that are specialized for a particular environment. Damming indirectly damages or destroys river turtle populations by decreasing their survival rate and decimating populations well before the consequences are recognized (Moll and Moll 2004).

The Traveston Crossing Dam, if constructed, would flood 77 km², including several thousand hectares of rich farm and pasture land that includes 33 dairy farms, 11 of which are close to transport and population centers, and all of which contribute over \$40 million dollars annually to the local economy. Not surprisingly, few locals are excited about the dam. They are, however, fiercely protective of their natural environment.

The dam project stands to displace hundreds of families, many of whom have held this land for generations. In addition to the potential loss of more than 1,000 freehold properties and all public infrastructure in the area, one must also consider the direct economic impact on the surviving local businesses in and near the proposed project. Although difficult to weigh against the need for an adequate supply of water, alternatives might exist that would avoid the either-or dichotomy facing the region today.

The water, which would normally flow to the communities downriver, would be stored behind a shallow dam. In the first stage, the "reservoir" is designed to have an average depth of 6 m. Average depth would reach 8 m in stage two, although a large portion would only be 2-m deep. At such shallow depths, the reservoir would not only be subjected to extensive evaporation, but also to very high rates of seepage, as well as contamination and known water quality problems emanating from high nutrient loads and diminished oxygen. Such a large expanse of still, shallow water with minimal flow, high temperatures, and stratification also is likely to encourage the growth of aquatic weeds and algae. The new environment will be better suited to exotic species of fish, such as Carp (*Cyprinus* sp.) and Tilapia (*Tilapia* sp.). At present, the Mary River is one of the few remaining southeastern Queensland river systems free of such large exotic fish, which proliferate quickly, out-compete native species, and feed voraciously on their young.

The downstream effects of inundating 500 ha of an endangered regional ecosystem that is currently designated as "protected" by the Queensland Vegetation Management Act further complicate the issue. The estimated 20% increase to the freshwater supply will have a negative impact on the Great Sandy Straits Marine Park and RAMSAR Treaty wetlands. Some studies have directly linked



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Local outrage is expressed in roadside signs.

decreasing fish health and productivity declines to reduced rates of flow. Commercial fisheries and tourism would also be affected adversely. The Great Sandy Strait alone contributes \$100 million annually to the local economy through tourism. This downstream region also serves as an important feeding ground for migratory shorebirds and a wide range of other bird and marine life, including sea turtles.

Inevitable floods would be very difficult to control without inundating upstream areas. Structurally, the bank would be difficult to stabilize, and erosion would further increase sediment and result in even shallower water. The proposed dam site lies over deep shattered rock that would need to be sealed to eliminate seepage, further disrupting groundwater flow.

The dam project would decimate many species of animal and plant life, including a number of threatened and endangered species. In addition to the endemic endangered Mary River Turtle and other iconic species, including the endemic endangered Mary River Cod (*Maccullochella peelii mariensis*) and the endangered Queensland Lungfish (*Neoceratodus forsteri*), this ecosystem also provides habitat for populations of at least two endangered frog species, the Giant Barred Frog (*Mixophyes iteratus*) and the Cascade Tree Frog (*Litoria pearsoniana*).

Both the Mary River Cod and Mary River Turtle are listed as endangered under the EPBC Act, with the Mary River Turtle also recognized as endangered by the IUCN. The Mary is the only river where these two species can be restored and protected; it is also the best remaining option for the endangered Queensland Lungfish. Five other turtle species and many species of fishes and frogs also stand to be affected by the dam, particularly if gene flow is blocked between up- and downstream areas.

The proposed dam site contains known habitat for all of the species mentioned. They might be able to survive for a time within impounded areas, but they cannot breed there. Although the Mary River Turtle has been bred in captivity, captive breeding is not a long-term solution. The species evolved and belongs in the Mary River. It could not be restored to the river once the habitat has been degraded — and recreating this ecosystem elsewhere is impossible.

In its natural environment, the Mary River Turtle requires sandy riverbanks to lay its eggs. Very few nesting beaches are known, and the most productive of these will be flooded. The Mary River Cod relies on deep, cool, shaded pools containing large woody

debris (snags) for breeding. Queensland Lungfish need shallow flowing riffles (which also support a number of macroinvertebrates eaten by all three of the endangered species) and dense beds of submerged aquatic plants on which to lay their eggs. The dam would destroy all of these. Undercut banks, riparian vegetation, and deep pools are critical habitat for the Giant Barred Frog.

Some provisions have been made to address a few of the problems. Fish passages, for instance, are planned. Unfortunately, they don't work well for turtles. Studies have shown that turtles do not readily enter fish transfer devices. Photographic evidence presented at the recent Conference on the Biology & Conservation of Australasian Freshwater Turtles in Brisbane, indicated that the devices often mangle those that do.

Many Australians are concerned that this project will turn out as badly as that of the Murray River (thus the “don't Murray the Mary” signs everywhere). Dams altered that river's natural flow from the original winter-spring flood and summer-autumn dry to the present winter low level and slightly higher summer level. Although these modifications ensured the availability of irrigation water, making the Murray Valley Australia's most productive agricultural region, they have damaged the ecosystem of the river and surrounding area, leading to dry-land salinity, which is now threatening agriculture. Other problems besides damaging the natural flow of the river have included agricultural run-off, introduction of pest species, and serious environmental damage along the river. That the Murray will become unusable due to salinity is a major concern, as it not only supplies agricultural irrigation, but 40% of Adelaide's domestic water.

Enough, however, of the gloom and doom; something is being done — and it was very evident in the Mary River Valley. Much useful information for this article, although not explicitly cited, came from various websites created by people hoping to save their homes, businesses, and livelihoods. We visited the headquarters of the “Save The Mary River” group while searching for turtles. The group's campaign has grown from an initial response coordinated by Mary Valley residents fighting for the future of their river and community to a truly broad-based national and international response. The website (<http://www.savethemaryriver.com/>) now serves as a portal to a range of related efforts to save this river for future generations. Their goal is to communicate the big picture to the Queensland and Australian governments, which are poised on the brink of making a decision that will provide either a truly reliable and sustainable water strategy for southeastern Queensland or one that will lead inevitably to the shameful and entirely avoidable degradation of a globally significant river system and all that it sustains. The battle cry is “Save the Mary River — there are much better options for Brisbane's water!”

Other useful sources of information included four important technical reports commissioned by the Australian Government Environment Minister regarding the Traveston Crossing Dam Environmental Impact Statement: (1) A review of effects of the dam on the Mary River Turtle by Dr. Gerald Kuchling (www.environment.gov.au/epbc/notices/assessments/2006/3150/pubs/independent-expert-report-on-the-mary-river-turtle-kuchling.pdf), (2) a review of effects of the dam on matters of national environmental significance by Associate Professor Keith Walker (www.environment.gov.au/epbc/notices/assessments/2006/3150/pubs/independent-expert-report-on-matters-of-nes-walker.pdf), (3) a review of



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Locals fear that the Mary will suffer the same fate as the Murray River.



EVA FORD

The Giant Barred Frog (*Mixophyes iteratus*) is another species that would be affected adversely by the dam.

effects of the dam on matters of national environmental significance by Professor Stuart Bunn (www.environment.gov.au/epbc/notices/assessments/2006/3150/pubs/independent-expert-report-on-matters-of-nes-bunn.pdf), and (4) a review of the hydrological model used to predict flow impacts in the EIS by Drew Bewsher (www.environment.gov.au/epbc/notices/assessments/2006/3150/pubs/independent-expert-report-on-hydrological-modelling-bewsher.pdf). However, our most valuable information came from the Tiaro and District Landcare Group, which hosted several symposium delegates after the Conference on the Biology & Conservation of Australasian Freshwater Turtles in Brisbane. This group was established in 1997 in response to a meeting of local landholders who were concerned about the health of the riverine environment. Landcare is a uniquely Australian partnership between the community, government, and business, which aims to “do something practical” about protecting and repairing their environment and promoting sustainable agriculture. They feel that the health of their district is dependent on the condition of the Mary River, her many sub-catchments, and all the plants and animals that she sustains.

One of the major concerns of Tiaro Landcare is conserving wild populations of the Mary River Turtle. Since 2001, Tiaro Landcare has been giving talks about the turtle, protecting nests to increase the survival of hatchlings, and funding a support scholarship for post-graduate students studying the turtle. A wonderful monograph, *The Mary River Turtle – Yesterday, Today, Tomorrow*, was developed

and published by Tiaro Landcare. It details all known aspects of the Mary River Turtle, including its history, natural history, distribution, threats, and conservation efforts. The monograph was released in October 2008 and is available for AU\$10 from Tiaro Landcare. Turtle conservation and sustainable fishing practices also are promoted through a catch-and-release fishing competition. Proceeds



MARILYN CORNELL

Several attendees of the Conference on the Biology and Conservation of Australasian Freshwater Turtles joined the Tiaro Landcare Group to see Mary River turtle habitat and were interviewed by local media.



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Conference attendees visit a Southern Snapping Turtle nesting site on the banks of the Mary River. From left: Peter and Sibille Pritchard, Peter Paul van Dijk, Gerald Kuchling, Chuck Schaffer, and Vicki and Adrian Ross.

support conservation of both the endangered Mary River Cod and the Mary River Turtle. The Landcare group effectively keeps the Mary River Turtle in the public eye with a more whimsical approach. Many shops in Tiaro and surrounding areas sell delicious chocolate

turtles, supplementing funds from other sources that, for example, protect nesting beaches. The group is in the process of developing a website (www.maryriverturtle.org.au), which will include details of past and future turtle projects and activities.

In 2008, Tiaro Landcare members noticed another species of freshwater turtle (*Elseya albigula*) nesting on their property, and so began another phase of the Tiaro Landcare turtle protection program. Eighty-eight wild hatchlings emerged as a result of nest protection.

The urgency of meeting the water needs of the Australian people is definitely understandable, but sometimes the exigency and stress of the moment point to the first and most obvious solution as the only answer. No disrespect is meant to the people or government of Queensland, but from the somewhat detached view of outsiders, we would suggest that the resolution to the water crisis must come from lucid and informed planning that considers all alternatives and their potential impact on unique species found nowhere else on Earth.

Acknowledgements

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Marilyn Connell of Tiaro Landcare Group checks the electric fence that protects the major nesting beach for the Mary River Turtle.



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Grids protecting nests, like this one placed by the Tiaro Landcare Group, greatly reduce nest predation.



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Peter Pritchard admiring the obvious community support of native wildlife.



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Occasionally, however, even nest protection fails to deter Goannas.



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A Southern Snapping Turtle (*Elseya albigula*) emerges from a protected nest site on the banks of the Mary River.

Snapping Turtle (*Elseya albigula*) nesting site on the banks of the Mary River and to Frazier Island. Glenda Pickersgill and The Save The Mary River Group and Eva Ford and the Mary River

Catchment Co-ordinating Committee spent hours providing background and literature on the Mary River dam project.

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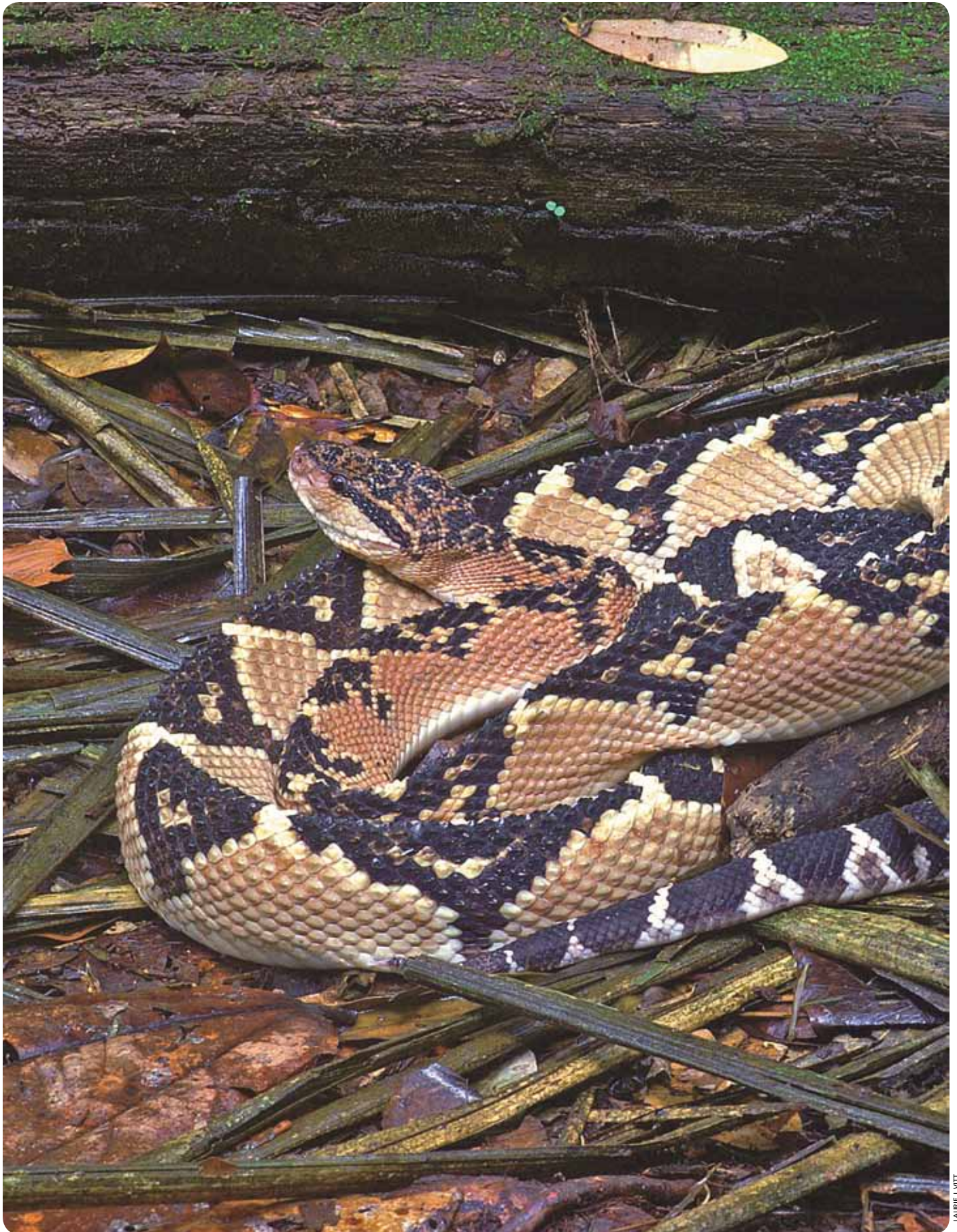
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Possibly the longest of all vipers, the Bushmaster (*Lachesis muta muta*) is endemic to tropical rainforests and lower montane wet forests of Central and South America.