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CONSERVATION AND THE CASE OF THE GOLDEN TOAD

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The demise of the Golden toad *Bufo periglenes* has been the subject of a number of recent articles (Pounds, 1990-92) and one major paper (Crump, Hensley and Clark, 1992). It is an endangered species listed in Appendix I of CITES and occurs in just 4 km² of elfin cloud forest on the Cordillera de Tilarán in northern Costa Rica. Since 1987, when large numbers gathered to breed, it has disappeared and Dr. Alan Pounds, resident biologist at the Monteverde Cloud Forest Reserve, and other amphibian biologists are attempting to find out why.

Unfortunately, it is evident that this toad has been neglected in the past and that ongoing research into the reasons for its decline is going to be too long-winded to bring about any immediate change in its fortunes. Furthermore, the failure of the 1987 breeding season when - despite the massive number of eggs laid - all but a handful of young died, could and should have been prevented. We are failing the Golden toad and must radically change our approach to its conservation and that of many other species like it.

There tend to be two camps amongst conservationists: the reporters, experimenters and legislators which I call the talkers, and those who actually go out and take positive action to save endangered species - the doers. There is a distinctly *laissez-faire* attitude prevalent in the former group that if you leave a species alone undisturbed and protected by law, it will somehow spontaneously recover. I believe that this view is, to say the least, wishful thinking. And there is no better example to illustrate the point than the Golden toad because it lives in a completely undisturbed tract of protected cloud forest where it is free of persecution by man and yet it is still declining. Sadly there are many other species of plants and animals in this predicament. Some like the Golden toad are particularly vulnerable to the vagaries of the weather, and others have complicated life-histories. Whatever the reasons for their lack of success, though, they need intensive care - a decisive and practical "hands-on" approach. The trouble is that if we don't get our acts together and do something to save them, those of us who purport to be involved in endangered species conservation will ultimately bear the same responsibility for any extinctions which do occur as the timber men, polluters and animal dealers who are usually to blame. It isn't good enough to say that these species have died out on their own and that we are therefore absolved. After all, even if there is no direct evidence of man's influence in present declines, it is almost certain to have played a part somewhere along the line. So let's consider the case of the Golden toad and what positive steps we can take to save it.

When the toad was discovered by Jerry James of Monteverde in 1963 it caused quite a sensation in the herpetological world, mainly because of the amazing golden orange colour of the males. Professor Jay Savage who formally described it three years later even commented in his paper: "I must confess that my initial response when I saw them was one of disbelief and suspicion that someone had dipped the examples in enamel paint".

When Prof. Savage and his colleague Dr Norman Scott visited the site where the toads had been found, they were equally dumbfounded when they saw at least 200 within a radius of just 5 metres. They had been told by Jerry James that the toads only appeared during a brief period between April and June when they breed and this information, combined with their own observations, strongly indicated that the Golden toad is an "explosive breeder", gathering in enormous numbers around small, temporary pools between the roots of forest trees, only when conditions are just right.

Since Prof. Savage's original paper was published in 1966, little work has been done on the Golden toad and most information acquired about it since then has been anecdotal. However, in 1987 Prof. Martha Crump of the University of Florida went to Monteverde to study it in detail. That year proved to be an exceptionally good one for Golden toads and over 1,500 were found at five different breeding ponds in an orgy of mating and egg laying. Prof. Crump discovered, amongst other things, that each female lays from 200 to 400 eggs and that the tadpoles take up to 5 weeks to metamorphose. Yet the results of the '87 season were a disaster because, before the eggs had a chance to hatch, the ponds dried up and out of some 30,000 potential toads, only 29 at most (Crump's estimate) survived to complete their metamorphosis. This catastrophe should not have been allowed to happen.

Several years ago, while filming for BBC Television in north Borneo, I was making my way down from a helicopter landing pad in a montane forest clearing to a camp site by a river. As I entered the forest, I came across a small pool of water containing a large number of treefrog tadpoles and since the pool was obviously in the process of drying out, I made a mental note to return the next day and take the tadpoles to a safer place. When I did return and reached the spot where the pool had been, there was just a layer of damp, cracked mud and a few shrivelled bodies.

This experience taught me a lesson and ever since, when I have found tadpoles in pools threatened by desiccation - which is a common enough occurrence amongst species which utilize temporary pools - I have always rescued them there and then. For this reason, I can say with my hand on my heart, that I would not have let those Golden toad eggs desiccate and die, even if I too had witnessed the fantastic spectacle of 1,500 individuals in a frenzy of breeding activity, the event which evidently lulled the Monteverde scientists into a false sense of security.

As things turned out, the loss of the '87 offspring was particularly significant because, since then, only a handful of Golden toads have been found and since 1991, none have been found at all. Prof. Crump rightly says that the failure of the 1987 breeding season does not in itself explain why the adult toads have disappeared, but these failures could have been happening for several years running and could therefore have had a cumulative effect. No-one studied the toads in detail before 1987, so no-one knows.

Since 1987, Prof. Crump and her colleagues have, in addition to looking for Golden toads at all known sites, been carrying out a study of environmental factors which might have led to declines and the results of this work have been published recently (Crump, Hensley and Clark, 1992). Prof. Crump's team draw attention to the fact that the toads can't breed until the pools they use retain water, but that if the first rains of the year are too heavy, they run the risk of having eggs or tadpoles washed out onto the forest floor with little chance of survival. On the other hand, if the

rains are too light, the pools may fill, only to dry out again after a relatively short period of dry weather; the very scenario tragically demonstrated in the '87 breeding season. For these reasons, they suggest that the Golden toad has what they call a "narrow window of time" in which to breed, when conditions are just right - not too wet and not too dry - and that it is therefore highly vulnerable to unfavourable weather conditions.

The team conclude by saying that the toads may be hiding in retreats waiting for more favourable weather, or they may have suffered real declines in the adult population. They call for long-term monitoring and carefully controlled field experiments to address the factors responsible for declines, but here I take issue with them. There simply isn't time. After all, the toad's present critical status is at least partly due to 24 years of comparative neglect. It is reminiscent of the householder who contacts his insurance company about a hole in the roof, only to be told that a surveyor will be sent round to inspect it. The householder already knows the result of the survey - that there is a hole in the roof - and the surveyor's report does nothing to stop the water coming in.

To make matters worse, because a number of other amphibians in different parts of the world are also in serious decline, the scientists believe that a common factor may be responsible and this belief has deflected them from the immediate problem of the Golden toad. OK, they may be right and a world-wide factor may be responsible, but what if there isn't one? They should do no more than keep in touch with biologists working on other declining species and look out for common factors. If they put too much effort into solving amphibian problems in general, rather than those of the Golden toad in particular, they run the risk - even if they're right - of making a breakthrough just as the last of the affected species becomes extinct. It is an all or nothing approach and it is wrong. They are straying from the original objective of saving the Golden toad and the issues are becoming shrouded in cloud forest mist. There is too much science here and not enough common sense.

The case for water shortage in temporary breeding pools as the principal cause of the demise of the Golden toad is overwhelming and all but proven. As Dr Pounds suggests (1991), ground water level is the key. Rainfall figures, which have been used as a measure of water availability in the past, do not reflect the amount of water underground and don't therefore indicate how long temporary pools will retain water. In 1987 aquifer-fed streams at Monteverde fell to the lowest levels ever recorded, with the result that another species of amphibian, the Harlequin toad *Atelopus varius* also suffered extremely adverse breeding conditions and has also disappeared.

There is a ray of hope for both species, though, because toads are usually quite long-lived animals and although we don't have any longevity figures available for the Golden or Harlequin species, our own toad can live to the ripe old age of 40. For this reason, it seems most likely that Prof. Crump and her team are right to suggest that the toads are hiding in retreats waiting for more favourable conditions before they emerge to breed and that they haven't actually died out. However, when they do reappear there will be no time to lose.

For a start, some specimens must be taken into captivity to begin a captive breeding program and ensure the survival of the species. No mention has been made of captive breeding by the Monteverde scientists, yet it is the only way to protect a species living in such a restricted and vulnerable habitat in the long term. A recent edition

of Julian Pettifer's "Nature Watch" on the Mauritius kestrel gave a shining example of what can be achieved. Welsh ornithologist Carl Jones took the eggs of the last breeding pair of kestrels left in the wild in 1981 and succeeded in rearing and breeding from the young. Since then he has conducted an intensive breeding program and the 100th captive bred bird was recently released. As Jones himself said "Management has got to be the way forward" and of course he is right.

Locally, the Golden toad breeding pools need attention, either by waterproofing with plastic membranes and/or by topping up when they are threatened by dry weather. And simple radio tracking would soon tell us where the toads "disappear" after breeding. So, let's stop *talking* about Golden toads and *do* something to save them before they are driven to extinction under a mountain of reports.

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