

12 Conclusions and Recommendations

The amphibian community at Luckunda is composed of at least 21 species. All areas surveyed were within 2km². Our observations suggest that three species of *Microhyla* and at least two (possibly four) distinct *Limnonectes* frogs occur at the site, bringing the total to 23-25 species. The community includes generalist species such as *B. melanostictus*, *M.ornata*, *L. limnocharis*, *E. cynophlytus*, *E.hexodactyla* and *H. tigerina* as well as endemics. It does not include stream species such as *Ansonia* and *Micrixalus*, that are characteristic of assemblages elsewhere in the Western Ghats, although stream amphibians do occur in the surrounding area. Of the endemics, *Philautus* species were the rarest members of the community.

According to Daniels (1992), 117 amphibian species occur in the Western Ghats, of which 89 are endemic. Only nine species (*P.maculatus* (= *pseudocruciger*), *B. melanostictus*, *M.ornata*, *R. montana*, *L. limnocharis*, *E. cynophlytus*, *E.hexodactyla*, *H. tigerina* and *Tomopterna breviceps*) are found throughout the region. He considered hills of medium elevation in the south of the range to have the richest communities. However, despite the diversity of amphibians in the Western Ghats, there have been few studies of individual communities. Daniels (1995) relied largely on individually collected specimens rather than samples from communities for his work on diversity of Western Ghats amphibians. He classifies species according to broad habitat types and elevational zones. He lists 16 species from evergreen forests, 11 from degraded forest, 6 from wet cultivation and 14 from human settlements. Taxonomic confusion forced him to group *Philautus* species together. Inger *et al.*(1984a, b) found 21 species of amphibians at Ponmudi, Kerala in an area more than 100km² over six weeks (May - June). They included two Caecilidae, three *Bufo*, two *Micrixalus*, four *Nannobatrachus*, three *Rana*, five *Philautus*, one *Rhacophorus*, *Pedostibes* and *Ramanella*. George (1995) records 18 species from Pooyamkutty, Kerala and noted that "some identifications were not completed". No *Philautus* are listed.

Clearly the highest research and conservation priority for amphibian communities in the Western Ghats is a revision of the taxonomy of the *Philautus* group. All recent authors have found the current taxonomy unusable, and many authorities prefer to omit specific designation to members of the group, pending a major revision. At Luckunda all four *Philautus* species showed very narrow habitat use, all appeared to be present in low numbers and one was observed to disappear when its tiny patch of habitat was destroyed by estate workers. It is very likely that *Philautus* is a much more speciose genera in the Western Ghats than has been previously supposed. Given the rate of destruction of Western Ghats forest and the restricted distribution of many *Philautus* species there is a genuine risk that species will disappear without ever having been documented. Until the taxonomy of the group is updated any discussion of diversity in forest amphibian communities is premature.

13. Health and Safety Report

Daniel Bennett

Nearest doctor was 20 minute drive from the estate, nearest hospital was 1 hour drive. Assuming competent staff with little equipment, a very comprehensive medical kit was carried. Items used were a course of antibiotics, pain killers of various strengths, iodine, and anti fungal powders. There were no serious health problems, the most pressing being severe toothache. However there were very serious safety problems to be addressed prior to fieldwork. The National Park adjoining the estate and the very tolerant attitude of the owner mean that Lackunda is included in the activity area of a number of large vertebrate species, notably tigers, elephants and gaur. Only the latter two were considered significant threats to safety, but they proved formidable obstacles. Tracks indicate that visits by both gaur and elephants occurred regularly. Gaur occurred in all study areas, elephants only in the uncultivated sites, although they visited cultivated areas elsewhere on the estate. No firearms were carried during the project To reduce risk the following precautions were taken at night.

1. Each group accompanied by an estate employee at all times.
2. Reconnaissance visits by two estate employees 15 minutes prior to fieldwork.
3. Clearly marked paths to all study sites
4. Maintain silence and restrained use of torches to and from study sites.
5. Eyes and ears wide open at all times.

As a result of these precautions work was curtailed severely in the Sacred Grove and disrupted at most other sites. Despite these precautions, both gaur and elephants were encountered on several occasions during nighttime field work, sometimes to the delight, rather than fear, of fieldworkers. All encounters ended without incident.

Two members of the team, both professionals, were permitted to seek out and handle venomous snakes. They caught cobras, kraits and vipers without incident. Handling of safe species during training sessions resulted in a number of bites, but no injury to any animals. Bites were all received with good humour and the lessons learned were considered invaluable.

14. References

- Daniels, R.J. 1991. The problem of conserving amphibians in the Western Ghats, India. *Current Science*, 60: 630-632.
- Daniels, R.J.R. 1992. Geographical distribution patterns of amphibians in the Western Ghats. *Journal of Biogeography* 19: 521-529.
- Daniels, R.J.R. 1995. Habitat selection in Western Ghats amphibians - Anura:: implications for species conservation. *Cobra* 20:7-15.
- Daniels, R.J.R. 1997. A field guide to the frogs and toads of the Western Ghats, India. Part I. *Cobra* 27:1-25.
- Daniels, R.J.R. 1997. A field guide to the frogs and toads of the Western Ghats, India. Part II. *Cobra* 28:1-24.
- Daniels, R.J.R. 1997. A field guide to the frogs and toads of the Western Ghats, India. Part III. *Cobra* 29:1-13..
- Daniels, R.J.R. 1997. A field guide to the frogs and toads of the Western Ghats, India. Part III. *Cobra* 29:1-13.
- Das, I. 1995. Size-gradation in synoptic frogs in South India. *Asiatic Herpetological Research*. 6:38-44.
- Das, I. 1996. Resource use and foraging tactics in a south Indian amphibian community. *Journal of South Asian natural history*, 2: 1-30.
- Duellman, W. Trueb, L. 1986. *Biology of Amphibians*. McGraw-Hill Inc. New York.
- Fowler, J. Cohen, L. Jarvis, P. 1998. *Practical statistics for field biology*, second edition. John Wiley and Sons, Chichester.
- Gauch, H.G. 1983. *Multivariate Analysis in Community Ecology*. Cambridge University Press.
- George. 1995. Amphibian survey at the proposed Pooyamkutty hydro-electric power project site, Kerala. *Zoos' print* July:1-4.
- Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek and M.S. Foster. 1994. *Measuring and monitoring biological diversity. Standard methods for amphibians*. Smithsonian Institution, Washington DC
- Holt, R.D. 1984. Predation, apparent competition and the structure of prey communities. *Theoretical Population Biology*, 12: 197-229.
- Huey, R.B. Pianka, E.R. & Shoener, T.W. 1983. *Lizard Ecology*. Harvard University Press, Massachusetts.