

A Remarkable Feeding Behavior and a New Distribution Record of *Varanus salvator salvator* (Laurenti, 1768) in Eastern Sri Lanka

L.J. MENDIS WICKRAMASINGHE¹, L.D.C. BHATHIYA KEKULANDALA¹,
P.I. KUMARA PEABOTUWAGE² and D.M.S. SURANJAN KARUNARATHNA^{3,*}

¹*Herpetological Foundation of Sri Lanka*
Thalarukkarama Road, Kudawaskaduwa, Waskaduwa, Sri Lanka
E-mail: boiga2000@gmail.com

²*Young Zoologists' Association of Sri Lanka*
Department of National Zoological Gardens
Dehiwala, Sri Lanka
E-mail: peabotuwage@gmail.com

³*Nature Exploration & Education Team*
No: B-1 / G-6, De Soysapura, Morauwa 10400, Sri Lanka
E-mail: dmsameera@gmail.com
*corresponding author

Abstract- We describe a unique feeding behavior of *Varanus s. salvator* observed within Lahugala National Park, Sri Lanka. The lizard was observed lashing its tail quickly from side to side while submerged in a shallow waterhole, which displaced water and fishes from the waterhole onto the land. More than 30 fishes were expelled onto the land, of which many were subsequently consumed by the monitor. This observation highlights the significance of isolated waterholes in the dry zone to sustain wildlife populations during the dry season, and represents a new distribution record for *V. s. salvator* in eastern Sri Lanka.

Introduction

Varanid lizards (Genus: *Varanus*) in Sri Lanka are represented by *V. bengalensis* Daudin, 1802 and *V. salvator salvator* Laurenti, 1768 (Das, 2001; Deraniyagala, 1944). Both species are common in Sri Lanka as well as in neighboring India (Daniel, 2002; De Silva, 1998). The water monitor, *V. s. salvator*, as implied by its common name, prefers aquatic habitats and is widely distributed throughout Sri Lanka in wet, dry, and intermediate zones up to elevations of about 1000 m (De Silva, 1996; Gaulke & De Silva, 1997; Karunaratna *et al.*, 2008b). Generally, *V. s. salvator* reaches a total length of over 2 m and is primarily diurnal

by habit, active between 0700-1700 h (Wikramanayake & Dryden, 1993). *Varanus s. salvator* are useful as pest control agents, despite being categorized as scavengers that mainly feed on animal carcasses (Das & De Silva, 2005; Deraniyagala, 1953; Rathnayake, 2001).

Many different feeding behaviors have been described in varanid lizards (e.g., King & Green, 1993; Horn, 1999; Pough *et al.*, 2004; Traeholt, 1993, 1994). Here we describe an unusual feeding behavior in *V. s. salvator* which is markedly different from those previously described for varanids.

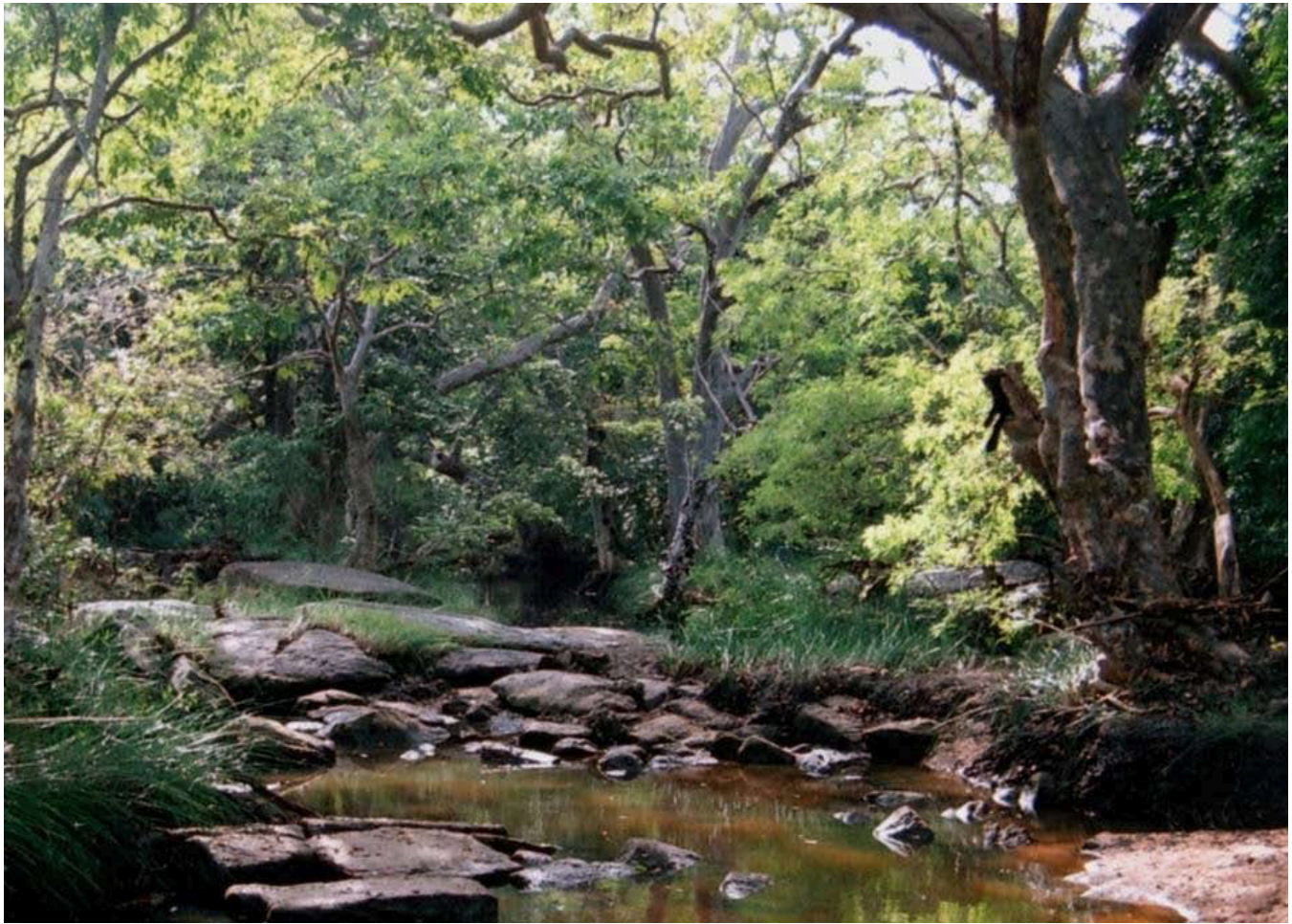


Fig. 1. Isolated waterhole in Lahugala National Park during the dry season.

Field Observation

The following observation was made in Lahugala National Park, located in the low country dry zone of Sri Lanka (81°42'10" E; 06°54'21" N), at 1120 h on 12 November 2005. The park belongs to Lahugala divisional secretariat division of Ampara District (Somasekaran, 1988). The mean annual temperature at Ampara, recorded from the closest meteorological station, is 29.8 °C, and relative humidity averages 64%, with the highest humidity levels recorded in December (Meteorological Dept. Data, 2010). The annual rainfall of the area is ca. 100–150 cm (Somasekaran, 1988). The vegetation of the site can be classified as tropical dry mixed evergreen forest (Gunatilleke & Gunatilleke, 1990), dominated by *Terminalia arjuna* (kumbuk), *Diospyros ebenum* (kaluwara), *Drypetes sepiaria* (weera) and *Manilkara hexandra* (palu) trees (Fig. 1). Three small waterholes were present at the field site, measuring ca. 200 x 100 x 30 cm, 400 x 200 x 30 cm, and 300 x 200 x 30 cm (length x width x depth).

A sub adult male *V. s. salvator* measuring approximately 60 cm in SVL, with a total length of ca. 1.5 m (Fig. 2), was first observed walking towards one of the shallow waterholes, which it then settled itself into. The lizard began rapidly waving its laterally compressed tail side to side, displacing water and some small fishes out of the waterhole (Fig. 3). After performing this behavior for about five minutes, more than 30 fishes, identified as catfish (*Mystus* sp. and *Heteropneustes* sp.), barbs (*Puntius* sp.), and climbing perches (*Anabas testudineus*) (Maduranga, 2003; Pethiyagoda, 1991), had been expelled onto the land. The monitor crawled out of the waterhole and consumed more than 10 fishes varying in size between 10 and 15 cm in length. Interestingly, it seemed to prefer *Puntius* and *Heteropneustes*, but ignored *Mystus*.

Discussion

Upon review of existing literature, we failed to find any reference to this interesting and unusual feeding



Fig. 2. Sub adult *Varanus s. salvator* in Lahugala national park (total length ca. 1.5 m).

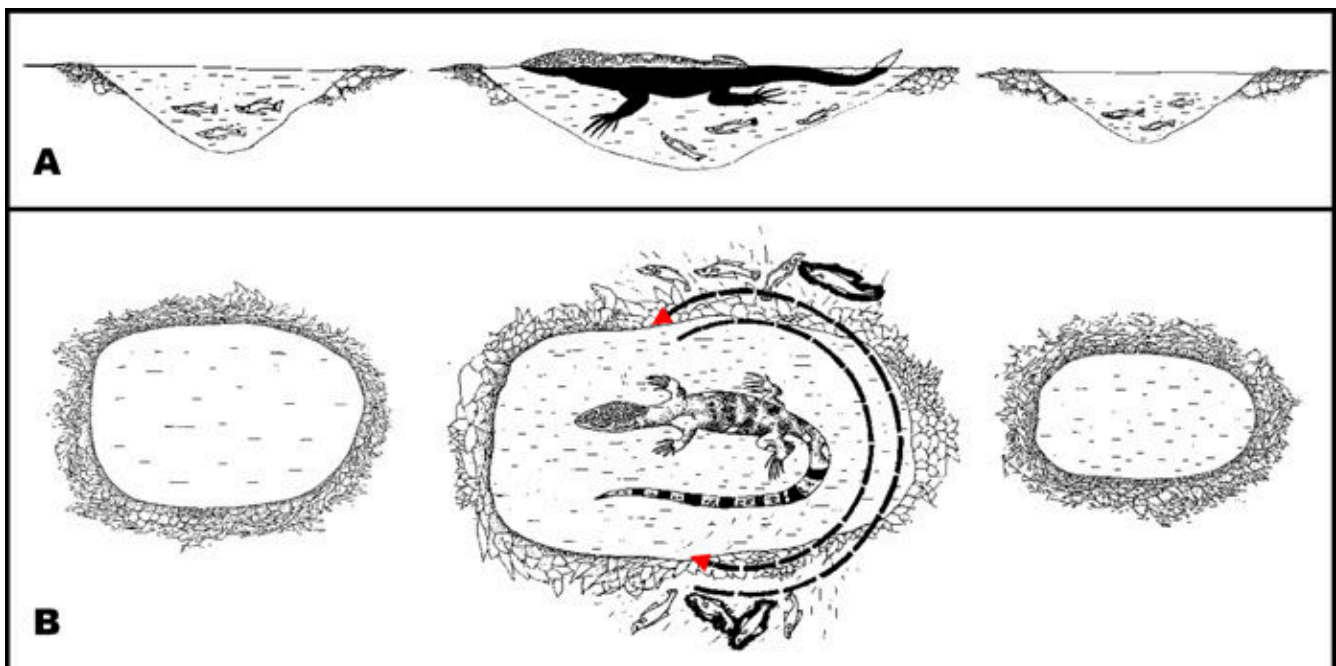


Fig. 3. Sketch of the water holes and fish feeding behavior of *Varanus s. salvator* in Lahugala: A) lateral view and B) dorsal view of three small waterholes. Red arrows indicate the direction of tail movements.

behavior in *V. salvator* or any other varanid (Cota *et al.*, 2008; Deraniyagala, 1953; De Lisle, 2007; Halliday & Adler, 2002; Horn, 1999; Khan, M. 1969; Pough *et al.*, 2004; Rathnayake, 2001; Smith, 1935; Somaweera & Somaweera, 2009; Traeholt, 1993, 1994). Hermes (1981) and Keith & Ginsburg (2010) described fish capturing behaviors in *V. mertensi* and *V. niloticus* which remind us of our own observation. In both of these species, the tail was curled into the shape of the letter C and used to corral fish in the shallows, making them easier to capture (Hermes, 1981; Keith & Ginsburg, 2010). This behavior is similar to the one reported here for *V. s. salvator*, in that both behaviors employed use of the tail to take advantage of fish trapped in shallow pools. However, since the tail was used in our own observation to expel fish from the water rather than trap them, we can conclude this new feeding behavior in *V. s. salvator* is very distinctive from that used by *V. mertensi* and *V. niloticus*.

This observation also happens to be a new distribution record for *V. s. salvator* in Sri Lanka, extending its range to the Lahugala area. Somaweera *et al.* (2004) have sighted *V. s. salvator* from Panama, ca. 20 km south-east of Lahugala, but Somaweera & Somaweera (2009) state that it is very rare in eastern parts of the country. We also conducted several field trips to Panama in search of *V. s. salvator*, but failed to locate any specimens. Whitaker

& Whitaker (1980) and other scientists (Somaweera & Somaweera, 2009), report that the species is absent from the south-eastern coast, and Somaweera & Somaweera (2009) noted that this species was not found east of the Walawe river. *Varanus s. salvator* is absent from Yala National Park complex, probably due to the high abundance of crocodiles (De Silva & De Silva, 2004; Somaweera & Somaweera, 2009), and it is also absent in areas subject to drought that are frequented by wild boar which are believed to prey upon hatchlings and juveniles (Deraniyagala, 1953). Recent work conducted by Bambaradeniya (2001) recorded *V. s. salvator* in Bundala National Park, and a larger population was reported from Rathgama area in Galle district (Amarasinghe *et al.* 2009).

According to the surveys we have carried out interviewing villagers in these areas, 96% of villagers have not seen this species in past 20 years (Fig. 4). Hence, this account does not only represent an unusual behavioral observation, but also a significant site record of the species. It also emphasizes the importance of isolated waterholes as a food source for *V. s. salvator* during the dry season. Although *V. salvator* is largely known as a scavenger, it is quite capable of capturing live prey (Amarasinghe *et al.* 2009; Das & De Silva, 2005; Deraniyagala, 1953; Karunarathna *et al.* 2008a; Pough *et al.* 2004; Rathnayake, 2000; Rathnayake,



Fig. 4. Wetland habitat surrounding Lahugala village during the wet season.

2001; Smith, 1935; Somaweera & Somaweera, 2009; Uyeda, 2009). The monitor's avoidance of *Mystus*, which is probably due to its spiny exterior (although Karunarathna *et al.* (2008a) report a case of predation on a large fish with sharp and spiny fins), suggests that *V. s. salvator* may be capable of discriminating between favorable and unfavorable prey items of a similar type. However, we recommend further detailed studies on the feeding behaviors of commonly distributed *V. s. salvator* in Sri Lanka.

Acknowledgements – The authors would like to thank Sandun J. Perera for his suggestions and improvement of an earlier draft of the manuscript. We would also like to thank D.P. Siyasinghe, former park warden of Kumana National Park in DWC and their staff for their assistance, Y.G. Jayathissa (IUCN - Sri Lanka), Mahesh Chaturanga and Niranjana Karunarathna (YZA - Young Zoologists' Association) for various support, and the villagers in Panama and Lahugala areas for their cooperation and for sharing their observations. Finally, we would like to thank Robert Mendyk and two anonymous reviewers for useful comments and suggestions on an earlier draft of this paper.

References

- Amarasinghe, A.A.T., G. Chaturanga & D.M.S.S. Karunarathna. 2009. *Varanus salvator* (Laurenti, 1768) in Rathgama Lagoon in Galle District, Sri Lanka. *Biawak* 3(3): 81-84.
- Bambaradeniya, C.N.B. 2001. Guide to Bundala: A Guide to the Biodiversity of Bundala National park – a Ramsar Wetland in Sri Lanka, IUCN Sri Lanka. 54 pp.
- Cota, M., T. Chan-Ard, S. Mekchai & S. Laoteaw. 2008. Geographical distribution, instinctive feeding behavior and report of nocturnal activity of *Varanus dumerilii* in Thailand. *Biawak* 2(4): 152-158.
- Das, I. 2001. Biodiversity and Biogeography of the herpetofauna of Southern Asia. Pp. 1-38. In C.N.B. Bambaradeniya and V.N. Samarasekara, An overview of the threatened Herpetofauna of South Asia. IUCN Sri Lanka and Asia Regional Biodiversity Programme, Colombo, Sri Lanka.
- Daniel, J.C. 2002. The Book of Indian Reptiles and Amphibians. Bombay Natural History Society and Oxford University Press, Oxford. 252 pp.
- Das, I. & A. De Silva. 2005. Snakes and other Reptiles of Sri Lanka. New Holland Publishers. UK. London. 144 pp.
- Deraniyagala, P.E.P. 1944. Four new races of the “Kabaragoya” lizard, *Varanus salvator*. *Spolia Zeylanica* 24(1): 59-65.
- Deraniyagala, P.E.P. 1953. A Colored Atlas of Some Vertebrates From Ceylon Volume 2: Tetrapod Reptilia. The Ceylon Government Press, Colombo. 122 pp.
- De Lisle, H.F. 2007. Observations on *Varanus s. salvator* in North Sulawesi. *Biawak* 1(2): 59- 66.
- De Silva, A. 1996. The Herpetofauna of Sri Lanka: a brief review. Graphic Land, Kandy, Sri Lanka. 99 pp.
- De Silva, A. 1998. Sauria (Lizards and Varanids) of Sri Lanka: A checklist and annotated bibliography. Graphic Land, Kandy, Sri Lanka. 52 pp.
- De Silva, M. & P.K. De Silva. 2004. The Yala wildlife reserve: Biodiversity and Ecology. Wildlife Heritage Trust publication Ltd, Sri Lanka. 238 pp.
- Gaulke, M. & A. De Silva. 1997. Monitor lizards of Sri Lanka: preliminary investigation on their population structure. *Lyriocephalus* 3(1): 1-5.
- Gunatilleke, I.A.U.N. & C.V.S. Gunatilleke. 1990. Distribution of floristic richness and its conservation in Sri Lanka. *Conservation Biology* 4(1): 21–31.
- Halliday, T. & K. Adler. 2002. The new encyclopedia of Reptiles and Amphibians. Oxford University Press, Oxford. 240 pp.
- Hermes, N. 1981. Mertens' water monitor feeding on trapped fish. *Herpetofauna* 13(1): 34.
- Horn, H.-G. 1999. Evolutionary efficiency and success in monitors: a survey on behavior and behavioral strategies and some comments. Pp. 167-180. In Horn, H.-G. & W. Böhme (eds.), *Advances in Monitor Research II. Mertensiella* 11, Rheinbach.
- Karunarathna, D.M.S.S., A.A.T. Amarasinghe & E.M.K.B. Ekanayake. 2008a. Observed predation on a suckermouth catfish (*Hypostomus plecostomus*) by a water monitor (*Varanus salvator*) in Bellanwila-Attidiya Sanctuary. *Biawak* 2(1): 37-39.
- Karunarathna, D.M.S.S., A.A.T. Amarasinghe & A. De Vos. 2008b. Preliminary notes on the monitor lizards (Family: Varanidae) within the National Zoological Gardens (NZG) Dehiwala, Colombo District, Sri Lanka. *Biawak* 2(3): 109-118.

- Keith, M. & A.E. Ginsburg. 2010. *Varanus niloticus* (Linnaeus, 1758) feeding behavior. African Herp News 51: 19-21.
- Khan, M. 1969. A preliminary study of the water monitor, *Varanus salvator*. Malay Naturalist 22: 64-68.
- King, D. & B. Green. 1993. Family Varanidae. Pp. 1-19. In: Glasby, C.G., G.J.B. Ross & P.L. Beesley (eds.), Fauna of Australia: Volume 2A Amphibia and Reptilia. AGPS, Canberra.
- Maduranga, H.G.S. 2003. Endemic Freshwater fish of Sri Lanka. (Text in Sinhala). National Zoological gardens of Sri Lanka.
- Pethiyagoda, R. 1991. Fresh water fishes of Sri Lanka. Wildlife Heritage Trust, Colombo, Sri Lanka. 362 pp.
- Pough, F.H., R.M. Andrews, J.E. Cadle, M.L. Crump, A.H. Savitzky & K.D. Wells. 2004. Herpetology, Third edition. Pearson Prentice Hall, USA. 736 pp.
- Rathnayake, N. D. 2000. Sri Lankan monitor lizards. Sri Lanka Nature 2(4): 52-53.
- Rathnayake, N. D. 2001. An account of monitor lizards in Sri Lanka: status and distribution. Occasional Papers of the Amphibia and Reptile Research Organization of Sri Lanka. 1:1-10.
- Smith, M.A. 1935. The Fauna of British India Including Ceylon and Burma, Reptilia and Amphibia. Vol. II. - Sauria. Taylor and Francis, London. 568 pp.
- Somasekaran, T. 1988. The National Atlas of Sri Lanka. Surveys Department, Colombo, Sri Lanka. 142 pp.
- Somaweera, R. & N. Somaweera. 2009. Lizards of Sri Lanka: A colour guide with field keys. Edition Chimaira, Germany. 304 pp.
- Somaweera, R., K. Sarathchandra, S. Karunaratne & C. Nuwansiri. 2004. A study on the avifauna and herpetofauna of Panama, Eastern Province, Sri Lanka. Sri Lanka Naturalist 6(1/2): 1-9.
- Traeholt, C. 1993. Notes on the feeding behaviour of the water monitor, *Varanus salvator*. Malay. Nat. Journal 46: 229-241.
- Traeholt, C. 1994. The food and feeding behaviour of the water monitor, *Varanus salvator*, in Malaysia. Malay. Nat. Journal 47: 331-343.
- Uyeda, L. 2009. Garbage appeal: relative abundance of water monitor lizards (*Varanus salvator*) correlates with presence of human food leftovers on Tinjil Island, Indonesia. Biawak 3(1): 9-17.
- Whitaker, R. & S. Whitaker. 1980. Distribution and status of *Varanus salvator* in India and Sri Lanka. Herpetological review 11(3): 81-82.
- Wikramanayake, E.D. & G.L. Dryden. 1993. Thermal ecology of habitat and microhabitat use by sympatric *Varanus bengalensis* and *V. salvator* in Sri Lanka. Copeia 1993(3): 709-714.