Notes on Varanus salvator marmoratus *on Polillo Island, Philippines*

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Abstract

Varanus salvator marmoratus appears to be widespread and common in and around Sibulan Watershed Reserve, Polillo Island. The lizard is much smaller than Gray's monitor lizard, *V. olivaceus*, with which it is broadly sympatric, and animals on Polillo possibly have much smaller body size than those from the mainland (Luzon) population. Examination of fecal material, stomach contents and thread from spool and line tracking indicated that the lizards are generalist feeders and that invertebrates and amphibians are important prey items. The Polillo population of *V. salvator marmoratus* shows unusually high tick infestation, which renders the animals worthless for the leather trade.

Introduction

Three subspecies of *Varanus salvator* occur on the Philippines, distinguished from animals elsewhere in Asia by scalation, pattern and colouration (reviewed in Bennett 1998). The animals have been heavily exploited for both meat and leather, and the conversion of forest to agricultural land on a massive scale may be responsible for a decline in lizard populations which has been reported on many islands in the Philippines. Here I present observations on *V.salvator marmoratus* on Polillo Island, gathered during a field study of Gray's monitor lizard, *V. olivaceus*, in and around Sibulan Watershed Reserve between July and September 1999.

Methods

Specimens of *V. salvator* were caught opportunistically by hunting parties looking for *V. olivaceus*, in unbaited, trigger-sprung noose traps set horizontally on the forest floor, and in vertical noose traps baited with parts of marine toads, *Bufo marinus*. Animals caught were marked with notches to the tail crest, examined and released at point of capture. Details of the following characteristics were recorded: snout-vent length (SVL) tail length, sex (determined by hemipenal eversion), weight, circumference of head, belly and tail base, recent and old injuries, presence of ectoparasites, colouration, shedding pattern, number of scales at midbody, number of scales from gular fold to insertion of hind limb and number of scales under 4th toe. Fecal samples and stomach flushings were examined to provide data on diet. Three animals had spool and line devices fixed to their tails before release (see Bennett (this volume) for details) and resultant thread trails were followed at irregular intervals.

Results

Around Sibulan Watershed Reserve 22 hunting excursions totaling 119 search hours caught a total of 11 *V. salvator*. Numbers of animals seen but not caught were not

recorded. One hundred and five horizontally set unbaited ground traps were set for 39 days (total effort = 4095 trap days) and caught a further nine specimens. No animals were caught after the 17th day and 88% of traps were still primed at the end of the experiment. Forty two traps days using baited, vertical noose traps (two set for five days, eight set for four days) caught eight specimens. Subsequently the traps were moved and the old bait retained for six days (48 trap days) during which time no animals were caught. When fresh bait was added six animals were caught over ten days (80 trap days). Four animals caught in vertical noose traps were found dead. Four animals were caught more than once in baited traps, replicates have been omitted from the figures given above.

Sex was determined for 34 animals, 28 male and 6 females (ratio: 4.7:1). Morphometrics for both sexes are given in Table 1. For males mean SVL/mass ratio was 2.36 (SD 0.6, range 1.62-3.83), for females 1.83 (SD 0.5, range 0.95-2.45). Summary of scale counts is given in Table 2. Animals had a mean of 4 ticks each (SD 6.9, range 0-29). All animals except the smallest (SVL 268mm) showed very heavy scarring on the ventral surface between the forelimbs. In most individuals this was the site of greatest tick concentrations. The relationship between tick numbers and body length is given in Figure 1. One female (17%) had a damaged tail compared with 34% of males. One male had a lost a hindlimb above the knee, otherwise no major injuries were recorded. This male appeared in good condition (mass/SVL ratio 1.74) and was subsequently followed by spool and line tracking (see below).

Data on diet was obtained from fecal samples of seven individuals and four dissections. Amphibians (including *Rana woodworthi* and *Bufo melanostictus*) were the most common prey type, occurring in 55% of samples, followed by coleopterans (36%), crabs and orthopterans (27% each), reptile eggs (18%) and birds (9%). Two dissected individuals contained fat bodies representing 3.2 and 1.4% of overall body weight. Testes from three dissected individuals accounted for a maximum of 0.6% of body weight. Only in the largest animal (430mm SVL, 1420g) did testes show clear evidence of increased blood supply.

	Mean SVL (mm)	SD	Range	N	Mean mass (g)	SD	Range	N
Males	391	43	335-493	28	961	354	555-1950	30
Females	342	53	268-416	6	645	254	255-1020	6

Table 1. Morphometric data for *Varanus salvator marmoratus* on Polillo

	Mean	SD	Range	N
Midbody	141	7.6	128-157	35
Lateral	90	4.5	84-102	31
4th Toe	28	1.4	25-31	34

Table 2 Scale counts for *Varanus salvator marmoratus* on Polillo

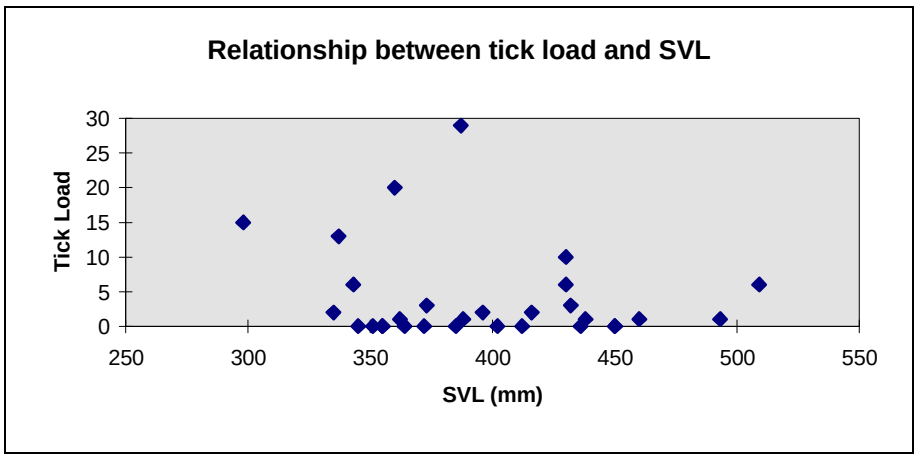

Figure 1. Tick load in *V. salvator marmoratus*

Discussion

V. salvator marmoratus found on Polillo did not differ in scalation from those described by Gaulke (1992) from Calauit Island, although the Polillo animals had a slightly higher lateral scale row count (on Calauit mean=88, range=80-98). They were much smaller than the Caluit animals, which had a mean SVL of 54.5cm. Whether this difference is an artifact of bias from the sampling methods used or a real difference is unclear. Possibly the lizards inhabiting the forested areas are mainly young (immature) and the older animals frequent other (coastal?) regions.

Gaulke (1992) estimated a total population of 913 animals on Calauit Island (3760ha). No such estimate is available for Polillo, but *V. salvator* is still common in forested areas around Sibulan, and probably in both cultivated and uncultivated habitats elsewhere on the island. The relatively high yield of *V.salvator* per unit effort suggests that it is more abundant than *V. olivaceus* in the study area. However the data must be treated with caution considering the low levels of activity of the latter species (Auffenberg 1988) which reduces the likelihood of the animals encountering traps or hunting groups.

Gaulke (1992) noted that *V. salvator marmoratus* on Calauit consume the marine toad (*Bufo marinus*) without ill effects and it appears that the animals on Polillo do the same (V. Yngente, personal communication). The other widespread monitor lizard in southeast Asia, *V. indicus*, is reported to die after eating this amphibian. Whether immunity to the skin toxins occurs in all populations of *V. salvator* is unclear because it has only been reported from the Philippines. Otherwise the diet of *V. salvator* on Polillo is similar to that reported for other populations (Traeholt 1993, 1994a&b, Vogel 1979) and supports the hypothesis that the species acts as an generalist forager, eating any animal it is capable of overpowering.

Cursory observations of the western coast suggests that much of the mangrove cover on Polillo remains intact. Destruction of mangroves has been cited as a cause of the demise of *V. salvator* populations elsewhere (Whitaker and Whitaker 1980, Das 1988). The mangroves are likely to contain large populations of lizards, although this

has not been investigated. Exploitation for leather is also considered to be contributed to the species' disappearance in some areas. In the case of the Polillo population it is unlikely that collecting for such purposes will be a threat, because of the unusual amount of tick damage evident on the ventral scales, which probably renders the skins worthless. Tick infestations are heaviest in smaller animals, but the resultant scarring is permanent. Younger animals that lack extensive ventral scars are not accessible by traditional trapping methods and would not yield skins of a commercially acceptable width .

V.salvator is also a popular food item in the Philippines. The animals are hunted for food on Polillo, although apparently only for limited, local consumption. There has been some interest in the animals from mainland restaurant suppliers (V. Yngente, personal communication and although hunting on a commercial scale is unlikely at present, on account of the activities of the Polillo Wildlife Steward, the island may harbour much larger populations than can be found on mainland Luzon and will increase in potential value as mainland populations dwindle. Future studies should therefore investigate the status of populations in coastal areas of Polillo, particularly where mangrove habitat is still abundant.

Conclusions and Recommendations

Polillo Island contains a large population of *Varanus salvator*, an animal of considerable economic importance throughout southern Asia. As in other areas the species is a generalist feeder, consuming a range of vertebrate and invertebrate prey. A combination of relatively low human densities, intact coastal mangroves and scale damage due to heavy tick infestations (which makes the animals' hides worthless) suggest the status of the species is secure at present. Future studies of the animal should concentrate efforts in coastal and agricultural areas. The traditional vertical trigger-sprung traps are not suitable for non-destructive studies of monitor lizards because they catch individuals by the neck, making some mortality inevitable. A suitable alternative is the use of nooses set horizontally on the ground, which trap animals by the limbs.

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