

# THE MONITOR LIZARDS OF CAMIGUIN ISLAND, NORTHERN PHILIPPINES

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## SUMMARY

A short survey study was undertaken in February 2005 on Camiguin Island of the Babuyan group, northern Philippines to confirm earlier reports of the presence of a fruit-eating monitor lizard and a possible distinct subspecies of the Water Monitor Lizard *Varanus salvator* on the island. After conducting brief visits to three sites and interviews with local residents, no evidence of a *Pandanus*-eating monitor lizard was found. Examination of a *V. salvator* captured by a local resident indicates that it is not distinct from *V. salvator marmoratus*.

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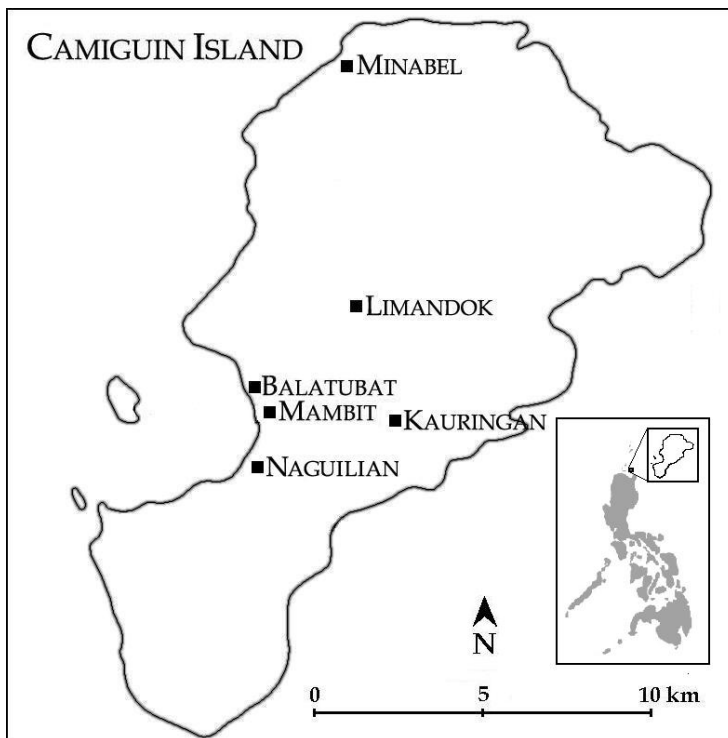
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## INTRODUCTION

Monitor lizard species that are mainly fruit-eating are known to occur only in the Philippines. They are *Varanus olivaceus* (Vulnerable – IUCN, 2003), which has been recorded in Polillo, Southern Luzon and Catanduanes, and the recently described *Varanus mabitang*, which occurs on Panay (Gaulke & Curio, 2001). Field studies indicate that fruits of the *Pandanus* palm are an important food item for all known populations (Auffenberg 1988, Bennett 2000, Gaulke and Curio 2001). More recently, there has been photographic evidence of the occurrence of a frugivorous varanid in the Northern Sierra Madre Natural Park in northern Luzon (M. Van Weerd, pers. comm.). The true distribution of these lizards is only beginning to be understood. Their existence has been largely unnoticed because they are difficult to see or study in the wild and they are commonly mistaken for their meat-eating relatives *Varanus salvator*.

The Babuyan Islands, lying north of Luzon, were identified as a conservation area of extremely high priority for amphibians and reptiles under the latest iteration of the Philippine National Biodiversity Strategy and Action Plan (Ong *et al.*, 2002). In June 2003, a bill was filed in the Lower House of the Philippine Congress seeking to declare most of the Babuyan Islands and their surrounding waters a protected area.



**Figure 1.** Map of Camiguin Island

Camiguin Island (N 18° 56' E 121° 55') in the Babuyan group of islands (Figure 1) occupies an area of only 166 km<sup>2</sup>, but it rises as high as 828m above sea level. Camiguin is characterized by steep forested hills overlain with clay, ricefields in small river floodplains and a volcanic cone (Mt Camiguin) in the south. Its population of almost 4,000 people is concentrated in three main settlement areas: Balatubat and Naguilian along the island's southwestern cove; and Minabel on the northwestern coast.

Camiguin has been the subject of little herpetological exploration. The Smithsonian Institution collected specimens in 1989 and from this expedition the wolf snake *Lycodon bibonius*, known only from this island, was described by Ota & Ross (1994). However, much of the results of this work remain to be

published. Lazell (1992) believes there is an undescribed species of flying-lizard from the island. A specimen of *Varanus salvator* from this island appears to represent a distinct subspecies (R. Brown, pers. comm., cited in Anon., 2002) but further study is required to confirm this conjecture.

In 2004, Camiguin was visited by a team of researchers conducting a census of vertebrate wildlife in the Babuyan Islands. Six amphibian species and twelve reptilian species were recorded on the island, including *Varanus salvator* (Oliveros *et al.*, 2004). In addition, they reported to have found evidence of the presence of a fruit-eating monitor lizard in the island. However, no sighting of this lizard was made nor a specimen collected during that trip.

## OBJECTIVES

The aim of this project was to try to establish the presence and distribution of a frugivorous varanid on Camiguin Island. Specifically, the objectives of the study were to:

- Gather evidence such as photographs, fresh feces, and if an appropriate collection permit is secured, collect a voucher specimen, that will establish the presence and identity of a frugivorous monitor lizard on the island of Camiguin.
- Determine the diet of the lizard through fecal analysis.
- Describe the lizard's habitat in Camiguin and use *Pandanus* seedlings to infer its distribution
- Determine the subspecific identity of *V. salvator* on Camiguin Island
- Formulate recommendations for relevant follow-up studies and (if necessary) for a conservation management plan

## METHODS

Interviews of local residents were conducted to determine local knowledge of monitor lizard species on the island. A total of fifteen respondents from two of three barangays on the island – Balatubat and Naguilian – were interviewed using standard questionnaires. Fourteen out of the fifteen respondents relied on rice farming as their main source of livelihood. Slash and burn farming (14 respondents) and fishing (10 respondents) were frequent supplemental sources of income. Four respondents were hunters.

It was presumed that if a large lizard was regularly feeding on *Pandanus* fruits distributions of *Pandanus* seedlings would be similar to those found in other places occupied by similar lizards (i.e. high concentrations of plants on ridges with clumps of seedlings uphill of any prospective parent plant). On this basis it has been possible to identify areas inhabited by *Varanus olivaceus* on Polillo Island. It was further presumed that other similarities in the diet of the Camiguin animal and *V. olivaceus* would make it possible to identify important food trees quickly, and that these trees could be monitored with infra-red triggered camera traps.

Reconnaissance trips were made to three sites: Limandok, Kauringan and Mambit. Limandok was visited on 20-21 February 2005; Kauringan on 22-24 February; and Mambit on 25 February 2005. During these trips, the team: (a) searched for families of trees that are known to be used by other frugivorous monitor lizards; and (b) investigated other evidence such as the presence of fecal matter, unusual clumps of fruiting trees and cracked shells of land mollusks. At Limandok, an infra-red triggered still camera trap was installed on a *panglumboyin* (local name) tree where more than 800 scratch marks that were made by a monitor lizard were observed on its trunk. The trap was open for approximately 125 hours.

At the Kauringan site, where the team found *Pandanus* trees occurring along hilltops and ridges, the distribution density of adult and juvenile *Pandanus* plants was mapped following Bennett (in preparation). However, only the center 50 m x 5 m area was surveyed because of the high density of plants. The distance of plants along the transect and their perpendicular distance to the transect were recorded. Trees were classed as “adult” if they bore a trunk, in which case their height from the ground and their number of crowns were also noted; otherwise they were called “juvenile.” Furthermore, when juvenile plants formed a discreet group, they were considered to form a “clump.” A clump's position was measured from its approximate geometric center and the number of juvenile plants in the clump (“clump size”) was counted. Four transects on two peaks were mapped, one near the peak of Nagtapulan (671m) and three at the peak of Mt. Mapula-pula (~ 660m).

From results of the reconnaissance trips and interviews with local residents, previous evidence of the existence of a fruit-eating monitor lizard on the island was cast in doubt (see later text) and thus a proposed exhaustive survey of fecal material was not undertaken.

A live *Varanus salvator* captured by a local hunter was examined. The animal was released after biometric measurements, scale counts and photos of the live animal were taken.

## RESULTS & DISCUSSION

### Local knowledge of monitor lizards

Six (6) out of the 15 respondents interviewed said there are two kinds of monitor lizard on Camiguin Island. One, which they call “*banyas*,” the commonly used term for *V. salvator* by Ilocano speakers, is flesh-eating and occasionally preys on their domesticated chicks. The other, which they call “*lupi*,” is arboreal and fruit-eating. The nine (9) other respondents know only of the *banyas*.

Those respondents purportedly familiar with the *lupi* said it differs from the *banyas* by having a shorter snout, a shorter tail, a more bulky body, a pure brown dorsal color and a dirty white ventral color. This description is consistent among the six respondents. Furthermore, according to these people, the *lupi* feeds on fruits of trees they call *camarig*, *sidae*, *panglumboyin*, *anibong* and *aru-e* (all local names), none of which were in fruit during the study. Nobody claimed that the lizard ate *Pandanus* fruit, contradicting previous reports in 2004. When trees are not fruiting, the *lupi* feeds on grubs, they added. However, the respondents’ knowledge of the *lupi*’s diet was ambivalent as none of them has either seen the animal eat fruit or seen its feces or its gut contents.

There were only two accounts of captures and one sighting of the *lupi* in the living memory of respondents interviewed. One lizard was reported to have been captured near Nagtapulan in 2003 by a hunter and three were captured on the hills adjacent to the ricefields of Taneg by another hunter in the 1970’s. In the first case, the lizard was eaten but the hunter did not notice anything unusual about its taste, gut contents or intestines. In areas where *V. olivaceus* is known to occur, people hunt and eat it in preference to *V. salvator* since it is commonly reported to have healthier, better-tasting and better-smelling meat (M. Rosaros, pers. comm.).

According to respondents monitor lizard meat is a delicacy, preferably served with alcoholic drinks, as in other parts of the country. Aside from being a delicacy monitor lizards are also hunted in Camiguin for their bile, which supposedly has the ability to cure stomachaches, body pains and convulsions in children. Lizard skin was reportedly sold a decade ago to merchants from Luzon. Local residents harbor no fondness of monitor lizards, which are considered pests and bearers of bad tidings and whose name in the local language used as a verb “*agbanyas*” means “to betray.”

Five of the six respondents who claimed knowledge of the *lupi* were not born on Camiguin Island; they came to Camiguin as migrants from northern Luzon. According to these migrants, they know of the *lupi* because it also occurs in the Marag Valley in Cagayan province, Luzon, from where they originated. There have been no reports of fruit-eating monitor lizards from this area but documented evidence has been collected from as far north of Luzon as San Mariano, Isabela province, where local people call them *batitawa*. While these respondents’ previous knowledge of the *lupi* from Luzon (assuming the *lupi* is frugivorous) and the secretive behavior of fruit-eating monitor lizards could explain why they are aware of this kind of animal and natives of Camiguin are not, it is also possible that this pre-conception could also have led them to mistake the common *Varanus salvator*, which is also known to climb trees occasionally, for a fruit-eating monitor lizard.

## Site Observations

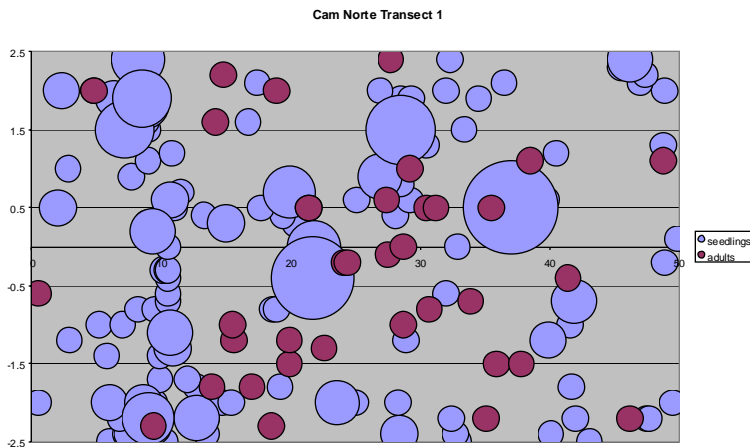
At Limandok, a tree locally referred to as *panglumboyin* near the Mamolo-molo trail was observed with more than 800 scratch marks that were certainly made by a *Varanus* lizard based on their length and position on the trunk. However, the camera trap that was installed near this tree recorded only a *Sphenomorphus* skink. Inside a dead *anibong* tree (*Caryota rumphiana*) near the Lipit trail, grubs of rhinoceros beetles (family Scarabaeidae) were found. *Pandanus* trees were observed on hilltops and ridges near this site in 2004 (C. Española, pers. comm.) but the location of these trees was not found during the two-day visit to the site. The site where an old clump of *Pandanus* seeds was found on a previous occasion was not visited. Land mollusks were abundant at Limandok and empty cracked shells were common on the forest floor.

At Kauringan, a high density of *Pandanus* trees was observed on the ridges of Mts. Nagtapulan and Mapula-pula. The *Pandanus* fruits available on Camiguin (probably a form of *Pandanus tectorius*) are approximately 2.5 times larger than the fruit of *P. radicans* (Table 1) which commonly occurs in habitats on Polillo, Luzon, Catanduanes and Panay and supports fruit-eating lizards (Auffenberg 1988, personal observations).

**Table 1.** Dimension of *Pandanus* fruits

	Camiguin (n=45)	Polillo
	<i>Pandanus sp.</i>	<i>Pandanus radicans</i>
Length	48 mm ( $\pm$ 6.3)	30.1 mm
Width	27.8 mm ( $\pm$ 2.8)	20.2 mm
Mass	16.1 g ( $\pm$ 5.2)	5.6 g

A typical transect from Mt. Mapula-pula (Figure 2) yielded a mean density of 0.85 immature and 0.17 adult *Pandanus* per m<sup>2</sup>. Mean clump size was 1.6 ( $\pm$  1.6) seedlings. Detailed examination of 1,250m<sup>2</sup> of hill ridges and cursory inspections throughout fieldwork did not identify any clumps of immature plants uphill of a prospective parent.



**Figure 2.** *Pandanus* distribution along Mt. Mapula-pula

The *Pandanus* cluster collected in 2004 in Kauringan was taken from beneath an exposed root mass. A visit to the site yielded a similar cluster in exactly the same position. The position, size and condition of the seeds made it very doubtful that they represented the feces of a lizard and strongly suggested a rodent cache. Such caches have been reported for many forest rodents but have not been observed on Polillo where *Rattus everetti* is predominant.

The occurrence of *Pandanus* trees in very high densities along ridges and hilltops of Camiguin as high as 600m above sea level is interesting. If they were dispersed here mainly by rodents, why do they occur mostly along ridges and hilltops? Could they be used to infer the distribution of these rodents as they are used on Polillo Island to detect the presence of *V. olivaceus*? Are they an indication that *Pandanus*-eating lizards were once present on the island a long time ago? Answering these questions will help us understand how well *Pandanus* trees are indicators or predictors of the presence of species such as monitor lizards and possibly rodents in other areas.

At Mambit, no *Pandanus* trees nor other evidence indicating the presence of a fruit-eating monitor lizard were observed.

In all three sites visited, no fecal matter suspected to come from a large monitor lizard was found. Clumps of *Caryota* palm seeds and seedlings were commonly found but they were likely to have been dispersed by civet cats (*Paradoxurus hermaphroditus*). *Caryota* fruit are important in the diet of these mammals and fresh civet cat droppings that contain palm seeds were commonly seen in the forest floor. Although the team found several trees with scratch marks, there is no evidence that they were not made by *Varanus salvator*.

Appendix 1 lists tree genera that are important for *V. olivaceus* in Polillo Island. Their presence or absence on Camiguin is indicated. Trees were generally not fruiting during the survey. The benefits of using camera and video traps were not harnessed in this survey because they are more effective when set on trees that are in fruit.

### ***Varanus salvator* of Camiguin**

An adult female *Varanus salvator* (Figure 3) was captured by a resident of Brgy. Balatubat, Camiguin on 27 February 2005. The following measurements, scale counts and observations of the animal were made: Snout to vent length: 438 mm; Tail length: 718 mm; Total length: 1,156mm; Head length: 84 mm; Head height: 21 mm; Head width: 33 mm; Femur length: 7.3 mm; Tibia length: 64 mm; Girth: 195 mm. Number of supraoculars: 7; Number of mid-body scale rows: 140; Number of ventral scale rows: 87.

The nuchal scales were of equal size to the occipital scales, identifying the lizard as *Varanus salvator marmoratus* rather than a member of the nominate race. The midbody and ventral scale row counts are within the established range of *V. s. marmoratus* (137-181 and 80-95 respectively (Mertens 1942, Gaulke and Horn 2004)) and no characteristic of this specimen suggest that it differs from the typical form of *V. s. marmoratus*.

## **CONCLUSIONS AND RECOMMENDATIONS**

In summary, there is no verbal or physical evidence of a *Pandanus*-eating lizard on Camiguin. Although *Pandanus* are very abundant in some habitats no clumps of immature plants were found uphill of possible parent trees and their wide dispersal on hill ridges appears to be due to rodent activity.

If a fruit-eating monitor lizard occurs on Camiguin its ecology must be very different from that of the two species currently recognized. None of the methodologies developed on Polillo Island that infer occurrence from *Pandanus* distribution will be effective and, given the apparent extreme rarity of the animal, and the lack of evidence of its presence, the possibility of finding the animal in a short field study were so remote that continued investigations could not be justified.

Camiguin remains an important area for conservation of reptiles. The little information known about its reptilian fauna already suggests that the island is a small center of endemism. Further surveys are recommended to broaden our knowledge of the island's reptiles. In addition it would be desirable to implement a management plan to conserve the island's wildlife and natural habitats. The development and implementation of such a plan will greatly benefit from the cooperation of local government officials, government agencies, non-government organizations and members of the local community.



**Figure 3.** *Varanus salvator marmoratus* of Camiguin Island (Photo by CHO)

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### Appendix 1

Genera that are known to be eaten by frugivorous monitors elsewhere are listed below with their abundance and distribution on Camiguin Island.

*Pinanga* species - very common, widespread. Similar to *Pinanga insignis* but with fruits that turn from green to yellow and purplish-black when ripe. All *Pinanga* seen were low (individuals over 3m high were rare). *Pinanga* is important in the diet of *Varanus olivaceus* on Polillo and *V. mabitang* on Panay but was not recorded by Auffenberg (1988) in Caramoan Peninsula or Catanduanes. The seeds were frequently observed in feces of civet cats (*Paradoxurus hermaphroditus*).

*Caryota rumphiana*. - common, widespread. Important seasonally in the diet of *Varanus olivaceus* on Luzon and Polillo. Trees observed on Camiguin appeared identical to the variety on Polillo. Frequently observed in the feces of *Paradoxurus*. The hollow stumps of dead trees are often used for shelter and basking by both *V. salvator* and *V. olivaceus*. One examined on Camiguin Norte contained beetle larvae, a gecko (*Crytdactylus* sp) and a crab. No trees in fruit were observed although it was evident from *Paradoxurus* feces that fruit must have been available. A number of flowering trees were observed.

*Pandanus* - common, patchy distribution. Two species belonging to the genus were seen. One grows as a shrub or occasionally as a vine. The trunks are very thin and trees have multiple small crowns. The fruits of this species were not observed. The other species grows as a small tree and is discussed in the text. No trees with scratches were observed.

*Canarium vrieseanum* – rare. The only member of this important genus observed on the island. No trees with scratches were observed.

*Grewia* – absent. A tree with abundant and distinctive fruits that are of great importance in the diets of many animals for a few weeks in early summer on Luzon and Polillo. Local people did not recognize our description of it and it is probably absent from Camiguin Norte.

*Gnetum* – absent? Gymnosperms growing as trees or vines that are important in the diet of *V. olivaceus* on Polillo.