

Notes on the Vanuatu Megapode *Megapodius layardi* on Ambrym, Vanuatu

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Summary

The Vanuatu Megapode *Megapodius layardi* is endemic to Vanuatu (formerly New Hebrides). On the volcanic island of Ambrym it exhibited three different incubation strategies. It incubated its eggs (1) in burrows between decaying roots of trees; (2) in burrows at large communal nesting grounds in volcanically heated soils; and (3) in burrows on sun-exposed beaches. No mounds were found. In a study by the Vanuatu Protected Areas Initiative (VPAI) nesting grounds were mapped to monitor the population. Three communal nesting grounds were surveyed. Two were on promontories and one on a beach. The burrows were classified into three categories: active, probably active and old. The density of active burrows per hectare of the three sites was 82.4 for Promontory A, 43.5 for Promontory B and 10.5 for Buwoma Beach. Additional information of this poorly known species was collected from villagers in the north-west and west of the island. They have noticed a decrease in the numbers of birds and have expressed concern about the future of the species.

Le Mégapode de Vanuatu, *Mégapodius layardi*, est uniquement originaire de Vanuatu, (dit 'Nouvelles Hebrides' autrefois). Sur l'île volcanique d'Ambrym, il fait preuve de trois stratégies d'incubation différentes. Il couve ses oeufs premièrement dans des terriers situés entre les racines pourries des arbres, deuxièmement dans des terriers situés dans des grands terrains communaux de nids, et troisièmement dans des terriers situés sur des plages exposées au soleil. Aucun monticule n'est évident. Lors d'une étude par l'Initiative des Terrains Protégés de Vanuatu (Vanuatu Protected Areas Initiative, VPAI), les terrains de nids furent planifiés afin d'étudier la population. Trois terrains communaux de nids furent enquêtés. Les terriers furent classifiés en trois catégories; actifs, probablement actifs, et anciens. La densité des terriers actifs par hectare des trois terrains étaient de 82.4 pour le Cap A, 43.5 pour le Cap B, et de 10.5 pour la plage de Buwoma. Des données additionnelles sur cet espèce peu connue furent rassemblées des villageois dans le nord ouest et l'ouest de l'île. Ils ont constaté une diminution des nombres d'oiseaux et ils ont exprimé leurs soucis vis-à-vis le future de l'espèce.

Wan pijin, nem blong hem Namalau, *Megapodius layardi*, i stap long Vanuatu nomo (bifo, New Hebrides i nem blong Vanuatu). Long Ambrym, wan aelan wetem volkeno, Namalau i yusum trifala defren fasin long makem nes blong hem so heg blong hem i stap gud nomo; 1) ol i putum heg blong hem nekis rus blo tri wea ol rus i rotin 2) ol i putum heg blong hem wetem plenti narafala Namalau heg long graon wea volkeno i mekem groan i hot, 3) ol i putum heg blong hem insead sanbij wea san i makem i hot. Long Ambrym ol man i no fanem ples wea Namalau putum heg blong hem insaed wanples wea i gat plenti lif mo tri antap graon. Vanuatu Protected Areas Initiative (VPAI) i mekem wan stadi long ples wea ol Namalau i putum heg mo ol i mekem wan

map. VPAI i lukum long trifala ples wea Namalau i putum heg. Tufala ples i stap long graon wea i go aot long solwota mo namba tri ples i stap long wan sanbij. I gat trifala defren grup blong ples wea ol i putum heg; niufala, klosap niufala mo olfala. Namba blong niufala ples wea Namalau i putum heg insaed long wan hectare i 82.4 long ples A, 43.5 long ples B mo 10.5 long Buwoma sanbij. I no gat plenti save blong Namalau mo VPAI toktok plenti wetem ol man blong vilej long notwes mo wes Ambrym. Ol man i se namba blong Namalau i go daon bigwan mo ol i wari long fiuja long Namalau.

Introduction

Vanuatu, formerly known as the New Hebrides, is an archipelago in the south-west Pacific which consists of approximately 100 islands of varying sizes (Figure 1). The main group of islands form a "Y" shape with the western arm reaching to 13° S at the Banks and Torres islands, and the southern part of the 'Y' at 22° S at the islands of Matthew and Hunter, stretching over a distance of 1,100 km. The Vanuatu Megapode *Megapodius layardi* is found in the lowland areas of the larger islands in central and northern Vanuatu (Bregulla 1992). Ambrym, an island in the central group, has two active volcanoes in its centre. Along the north-west coast there are large nesting grounds for the Vanuatu Megapode which is locally known as Namalau or scrubduck (sometimes pronounced as "sikrapda"). It is partly protected by Vanuatu law between 1 July and 31 March.

The Vanuatu Megapode is endemic to Vanuatu and it is considered Vulnerable by Collar *et al.* (1994) and Dekker and McGowan (1995). It is a Restricted Range Species found in Endemic Bird Area F13 (ICBP 1992) and a priority species listed in the Megapode Action Plan 1995–1999 (Dekker and McGowan 1995). The family Megapodiidae is distributed all over Australasia with the Vanuatu Megapode as the only representative of the family in the country. There is little information available on its status, breeding biology, behaviour and threats to its survival (Jones *et al.* 1995).

The Vanuatu Protected Areas Initiative (VPAI) visited north Ambrym from 31 January to 15 February 1995 and, during discussions with Chief Willie Bongmatur of Ranmuhu village, concerns were expressed about the decline in the population of megapodes over recent years and the lack of data needed to make rational decisions regarding its conservation. The VPAI team was asked to undertake a survey that would help satisfy this urgent data requirement so that appropriate conservation measures could be applied.

The objectives of the study were to gain information about the megapode population on Ambrym in the form of baseline data of nesting sites and the collection of information which would increase the knowledge about status and threats.

Method

Surveys

There are two areas in the north of Ambrym where nesting grounds are located: one on the north-west coast near Buwoma and on the north coast around Rowo Hill (Figure 1). Only the north-west coast was surveyed.

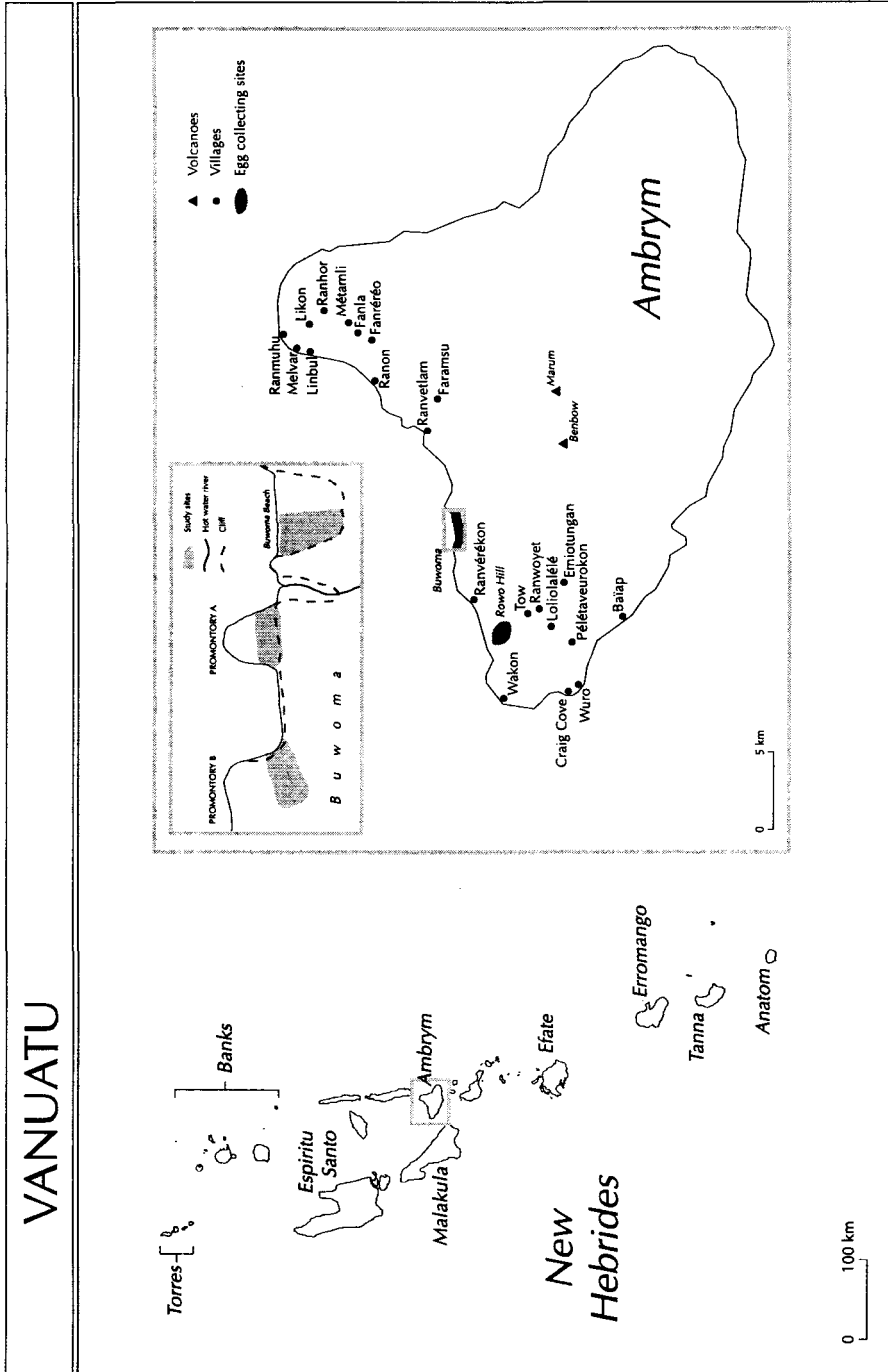


Figure 1. Vanuatu, Ambrym and the study area.

Table 1. Classification of the burrows of the Vanuatu Megapode

Burrow category	Description
A Active	Soft ground with leaves and twigs in the burrow Megapode seen emerging from the burrow Footprints around the entrance of the burrow
PA Probably active	Soft ground No leaf litter in the burrow when not on a beach Warm soil Stick sinks into the ground a long way Tunnel with soft earth
O Old	Appears to be abandoned due to digging difficulty Hard ground but there is an indentation Tunnel with surrounding hard ground

Three nesting grounds were chosen, two on promontories and one on a beach (Figure 1). Each site was mapped accurately using a Global Positioning System (GPS). Within each of the sites all the burrows were mapped and classified as either "active", "probably active" or "old". (Table 1). This method of classification was chosen whilst in the field.

On the promontories the burrows were mapped in 20-m bands on either side of the path whilst the burrows on the beach were mapped in a 90 × 80 m area. Only the visible depth of the burrow was noted for if the actual depth had been measured by using a stick there would have been a high probability of breaking eggs.

Villages

Villagers, including the Chiefs, were asked about the status of the megapode and additional information was noted. Villages were visited in the west and north-west of the island, especially those that were coastal, had nearby nesting sites or reputed to have egg collectors (Figure 1).

Results

Survey

A total number of 148 burrows were mapped; 54 burrows from Promontory A, 44 from Promontory B and 50 from Buwoma Beach (Table 2). If the "probably active" burrows were in fact still active, the number of burrows still in use by the megapodes was 29 for Promontory A, 27 for Promontory B, and 28 for

Table 2. Number and densities per ha. of burrows per nesting site according to state of use

Site	Area (ha)	Active		Probably active		Old		Total (n)
		n	Density	n	Density	n	Density	
Promontory A	0.34	28	82.4	1	2.9	25	73.5	54
Promontory B	0.23	10	43.5	17	73.9	17	73.9	44
Buwoma Beach	0.75	6	8.0	22	29.3	22	29.3	50
Total		44		40		64		148

Buwoma Beach, so 56.8% of the total burrows found were used for egg-laying.

Nine sightings of megapodes were made, of which two sightings were of birds which had been disturbed by the observer and flew up cliff-faces. They were very nervous and shy, hindering the opportunity of lengthy sightings. All sightings on Ambrym of the Vanuatu Megapode were of single birds.

Promontory A

Promontory A is approximately 140 m wide. To the north of the path there were a few small trees although it was mostly rocks as it approached the sea and to the south there were steep slopes leading up to the hills behind. The main trees were *Acacia spirorbis*, *Hibiscus tiliaceus* and *Cycas* sp. Ground vegetation mainly consisted of *Trema orientalis* and grass. The soil was grey, of volcanic origin, and there was plenty of leaf litter. Incubation heat came from decaying roots of trees and probably geothermal activity and radiation heat.

Promontory B

Promontory B was much larger than Promontory A and was not very accessible so only a portion was surveyed. There was a very sharp drop into the ocean on the northern side of the path and very steep slopes or cliff-faces on the southern side of the path. The main tree species were *Acacia spirorbis*, *Gyrocarpus americanus* and *Cycas* sp. The ground shrubs were mainly *Trema orientalis* and creepers such as *Mikania micrantha*. The soil was grey and fine, of volcanic origin. Incubation heat came from decaying roots of trees and probably geothermal activity and radiation heat.

Buwoma Beach

The beach is 390 m long, flat and enclosed by cliffs. Only 90 m of the beach were surveyed. There is a dry river bed running to the sea. The main tree species, *Acacia spirorbis* and *Hibiscus tiliaceus*, were mainly found growing further away from the sea. There were ground creepers such as *Ipomea acuminata*. Incubation heat came from decaying roots of trees and probably geothermal activity and radiation heat. The unsurveyed area had fewer burrows than the surveyed area. In the unsurveyed area the soil appeared to be harder and there was less leaf litter.

Village survey

Nineteen villages were visited, 11 in north-west Ambrym and eight in the west of the island. (Figure 1). In the past there were nests as far up as Ranmuhu but now there are none near the villages in the north-east, except at locations inaccessible to egg-collectors.

On 10 February 1995 an exhausted chick was seen which had just dug its way out of the burrow. Because incubation in megapodes lasts approximately two months, the egg from which it hatched must have been laid in late November or early December.

The number of eggs found per nesting ground varied greatly from 20 to 100. The eggs were buried approximately 30 cm deep in holes newly dug by birds, but if burrows had been excavated on previous occasions by egg collectors or other megapodes, the holes become deeper and could reach up to 2 m in depth (measurement from the original ground level to the end of the burrow).

Usually only the men from the villages harvested the eggs. From the north-west between 5 and 20 men go per trip about 1–4 times a year. The nesting grounds were more inaccessible from the north-east from where they can only be reached by canoe. From the west, access is easy to the nesting grounds at Rowo Hill which can be reached by foot. Villagers from the west also visit Tebi Beach area but canoes are needed for access.

The eggs are mainly used for private consumption or given to relatives. Some eggs are sold to villagers at 20–40 vt (£0.11–0.23) or to the local store for 30–50 vt (£0.17–0.29). When they go further afield to Port Vila, the price of a megapode's egg rises to 100 vt (£0.57).

Discussion

Nesting Strategies

Megapodes exhibit four incubation strategies (Dekker 1990, Jones *et al.* 1995) :-

- 1a. *Mound-building*. The parents construct a mound of leaves, twigs and sand. Microbial decomposition of the leaves provides the heat for incubation. When the correct temperature is reached eggs are laid in a hole in the top of the mound.
- 1b. *Burrow-nesting between decaying roots of trees*. A burrow is dug at the base of a tree, often a dead rotten stem, and the egg is laid near or against the decaying roots. Again microbial decomposition provides the necessary heat for the incubation of the eggs.
2. *Burrow-nesting in volcanically heated soils*. Eggs are buried in holes dug in areas where the ground is heated by geothermal activity, e.g. hot springs.
3. *Burrow-nesting in sun-exposed beaches*. Eggs are buried in burrows dug in sandy beaches which are exposed to solar radiation. At a certain depth the warm sand provides sufficient heat for the incubation of the eggs.

The incubation strategy of the Vanuatu Megapode falls into three of these four categories. The only strategy it does not exhibit on Ambrym is mound-building. However mounds have been described from the Banks Islands (Jones *et al.* 1995). Although the burrows in this study were coastal and away from the volcanoes there is a boiling hot stream entering the sea between Promontory A and Buwoma Beach suggesting that geothermal activity provided the heat necessary for the incubation of the eggs.

All sightings of megapodes were of individuals, which is remarkable as species *Megapodius* seem to be monogamous and are reputed to live in pairs (Jones *et al.* 1995). The reason for the birds being solitary at the nesting ground is not clear; it could be an indication that the males do not join the females in helping to dig the burrow but remain behind in their territory.

The peak nesting time is said to coincide with yam planting in June, July and August, although eggs are found all year round. This reproduction pattern is

similar to several other megapode species such as the Maleo *Macrocephalon maleo* and Moluccan Megapode *Eulipoa wallacei* (Jones *et al.* 1995).

Threats and hunting

Habitat destruction at the nesting grounds is probably one of the main causes for the reduction of the megapode population. In the past there were nesting sites all the way along the coast to the north of the island but due to encroachment of villages, gardens and coconut plantations the areas suitable for nesting have diminished. The main reason why the area around Tebi Beach has not been cultivated is its inaccessibility to regular visits. Previously a village was situated near Tebi Beach but volcanic activity had driven the villagers away as the ash ruined their crops. Areas around the villages which are inaccessible to humans are still used by the megapode.

Over the years the locals have exploited the megapode eggs as a valuable food source. Adults are hunted for consumption on an opportunistic basis. The yolk content of the megapode egg is 50–67% of the egg weight, compared with only approximately 30% in the egg of the domestic hen, making it an excellent source of nutrition (Dekker 1990). In the past the removal of some of the eggs had no significant effect on the population but with the increase in the human population there may now be over-harvesting. Almost all locals interviewed said that they considered the population in decline and that nesting areas had diminished.

Conservation action

As suggested from local information, from the loss of nesting grounds along the coast and possibly also from the high percentage of old burrows at the nesting grounds under study, a restriction on the uncontrolled harvest of megapode eggs should be implemented during the peak nesting period of June to August to guarantee that some eggs hatch. This needs to be applied and upheld by all the Chiefs from the villages in north-west and west Ambrym and supported by the National Council of Chiefs. Annual assessments should be made of the species's status and the number of eggs laid. After lengthy discussions on Ambrym with Chief Willie Bongmatur, Chief Tofort and Temar Rengreng, it was agreed to protect the Vanuatu Megapode using Wild Bird (Protection) 1988 from the Department of Agriculture. This allows the Minister to prohibit hunting by Order, on a specific island until the re-establishment of that population. Particular consideration should be given to the fact that there are currently no people living in the nesting areas and consequently previous Vanuatu laws and tabus imposed have not been respected in the past. Education and awareness programmes are seen as being of paramount importance and should be set up to ensure that the villagers understand and respect the ban or law put in place.

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