

KUCHU MAGO FROG PROJECT: DISTRIBUTION, ABUNDANCE, HABITAT PREFERENCE, AND CONSERVATION STATUS OF NATIVE FROGS OF THE NEW GEORGIAN ISLANDS, WESTERN PROVINCE, SOLOMON ISLANDS.

Final Report for four islands surveyed (Gatokae, Tetepare, Kolombangara, Vangunu Islands) in the New Georgian chain of islands, Solomon Islands. January 2007



**Submitted by Patrick Pikacha
PO Box R36
Ranadi, Honiara
Solomon Islands
Email: ppikacha@gmail.com
ppikacha@pacific-ocean.com
Website: www.melanesiangeo.org
www.pbase.com/ppikacha/rainforest**

Date: 08 January 2008

KUCHU MAGO FROG PROJECT: DISTRIBUTION, ABUNDANCE, HABITAT PREFERENCE, AND CONSERVATION STATUS OF NATIVE FROGS OF THE NEW GEORGIAN ISLANDS, WESTERN PROVINCE, SOLOMON ISLANDS.

The amphibian fauna of the Solomon Islands is very important to the ecology and equilibrium of the rainforests. On all the major islands of the Solomon Island archipelago frogs may be amongst the most abundant of terrestrial vertebrates. Native frogs of the Solomon Islands are generally understudied compared to other island countries in the South Pacific, such as in New Guinea and Fiji. Yet, the frog fauna of the Solomon Islands is just as important in terms of its diversity and abundance. There are 27 recorded species in the archipelago.

Native frogs range from large *Discodeles*, to *Platymantis* and small *Brachylodes* (see Appendix). However, many species remain extant in the remote montane forests of these oceanic islands. Some of which may be threatened due to global warming and deforestation.

The purpose of this investigation is to understand the relation of habitat and forest type and its relation to the frog species that occupy it. The goal of KUCHU MAGO FROG PROJECT in the New Georgian Islands, Solomon Islands is to carry out a comprehensive inventory of native frogs in these islands. This includes noting habit type, population densities, and distribution, with basic ecology data such as breeding seasons, threats to species. To revise a faunal list for the Western Province, with a focus on the vertebrates of this poorly know region of Melanesia; to raise conservation awareness by presenting talks to resource owners and in schools; and to liaise with Western Province leaders and conservation NGO's to promote and gazette areas of universal conservation value.

SPECIFIC OBJECTIVES

This research will focus on:

1. Recording the presence and abundance of all native frog species in 12 sites in New Georgian Island group.
2. Gather basic ecological information including activity patterns, densities, habitat characteristics, etc.
3. Assessing whether native frog populations are impacted by different land use practices such as logging, agriculture, invasive spp.
4. Assess the impact and spread of the cane toad throughout the New Georgian Islands.
5. Opportunistically record other vertebrates.
6. Test the efficacy of different inventory techniques for vertebrates in Solomon Island.
7. Recording traditional names of species.
8. Synthesizing frog information with forest layer data, watershed data, logging activity data, with known records and opportunistic accounts during this survey of birds, herpetofauna, mammals, and plants to develop a draft conservation strategy and action plan making this available to Western Province Government, Solomon Islands.
9. Publish an illustrated guide to the wild places of Western Solomon Islands for students and people of Western Solomon Islands.

SUMMARY OF RESULTS

HABITAT DESCRIPTION FOR FROGS OF GATOKAE, VANGUNU, TETEPARE, AND KOLOBANGARA ISLAND

Forests of the Solomon Islands

Plant associations making up the mixed lowland tropical rain forest remains complex and least understood in the Solomon Islands. The changes of floral genera and species as one ascends from the sea level to the upper montane or to the alpine regions, is not so distinct but eventually merges, from one, to the next level, until one notices a complete change of species as the tree heights decrease with altitude, the tree line ceases and the alpine meadows became the dominant feature. This is especially evident on Guadalcanal. But, the most obvious feature in the Solomon Islands natural forest is that it is very diverse in its composition and various species can attain to local dominance due mainly to ecological reasons that we do not yet fully understand.



Map of western Solomon Islands, with the New Georgian Islands in the south. (Map by Randal Storey)

Throughout the Solomon Islands, much of tropical lowland and hill forests have been extensively destroyed by logging or modified by agriculture and many of the present forest communities are either secondary forests or areas under permanent cultivation and herbs and grasses of foreign origin is the main plant group in some areas.

It must also be note to some degrees that such modification of forest is caused by natural disasters such as cyclones, land slides, and landslips due to earthquakes. Also some trees in coastal forests have been dying due to increased salinity.

The two broad vegetation types are the lowland zone and montane forests. In the Solomon Islands the altitude at which the montane, upper montane and alpine regions occur is somewhat lower compared to Papua New Guinea. Landslips on some islands in the New Georgian chain like Kolombangara Island have opened the forest to warmer air from the lowland.

The forests of the New Georgian Islands

The tropical rainforests of all four islands in the New Georgian Islands that were surveyed include, Gatokae, Tetepare, Vangunu, and Kolombangara Island are rather homogeneous.

Opportunistic surveys were carried out in the lowland disturbed forests of Vangunu and Kolombangara Island at elevations below 100m. Surveys were also carried in the upper reaches of both islands. On Kolombangara Island, a survey was carried out at above 1000m and on Gatokae at 885m on the summit of Mt Mariu. These forests are dominated by stunted forests, thick moss growing on the ground and vegetation, lichens, orchids, small montane bamboo, and groves of ferns. It is mostly wet here, and the very top of the ridges and high summits are covered in cloud.



Montane forests of Mt Mariu, Gatokae Island.

A short preliminary survey of the upper Kavolavata River on Gatokae Island was carried out in July 2006. The forests of the upper Kavolavata River are composed of large old forest stands of *Terminalia* sp, *Pometia pinnata*, and other hardwood tropical forest trees. The canopy emerges at a height of at least 20 – 30m in some parts. The understorey is composed of ferns, palms, and other trees.

General forest type

Lowland forests of four islands, Gatokae, Vangunu, Kolombangara and New Georgia have been extensively logged. The most hit has been Vangunu island. Hence the lowlands apart from some ridgelines which were not felled are composed of secondary forest growth.

Garden areas are extensive on Gatokae Island. Disturbance of lowland rainforests in general around the New Georgian Islands is up to the 400m contour. On Gatokae and Vangunu Islands there are still intact forests on the southeast side of both islands. However even these are becoming threatened as merchantable loggable forests begin to dry up on the major islands in the Solomons.

Most of the mid montane forests are unbroken and little trodden on Gatokae. An old settlement is located on a ridgeline at about 500m to the southeast. The upper forest (800) is covered in moss however not as substantial as that found on Kolombangara Island (1770m). Kolombangara has old settlements inside the islands crater and on the ridges on the north side of the island.

Tetepare Island is the largest uninhabited island in the South Pacific. It is also holds the largest tract of tropical lowland rainforests left in the Solomon Islands. Because it is mainly composed of lowland rainforests, it lacks the diverse habitats that exist on the other major islands in the New Georgian Islands.

Frog diversity and abundance is incredibly high in the New Georgian Island compared to other islands of the Solomon Islands and the south Pacific Islands.

Results:

Frogs of the New Georgian Islands

This survey represented the first frog survey of the New Georgian Islands. Field collections were made only on a few islands where access to the forest was made possible. This included Tetepare, Kolombangara, Vangunu, and Gatokae and some offshore islands in the Marovo Lagoon. First collections of the summit of Mt Mariu on Gatokae Island were made during the field work. A possible new species of *Platymantis* was collected here.

A total of 14 species of frogs were recorded in the New Georgian Islands. There were nine species identified during the field survey. These included *Brachylodes elegans*, *B. vertebralis*, *B. wolfi*, *Ceratobatrachus guentheri*, *Discodeles guppyi*, *D. malakuna*, *Platymantis solomonis*, *P. weberi*, *P. guppyi*, and *Rana krefftii*. Four species were unable to be identified and may be newspecies or species recorded however with varying morphologies. These amphibians were found on Gatokae and Vangunu Island. A possible new species was found at the summit of Mt Mariu (885m) of the genus *Platymantis*. A different species of the genus *Platymantis* was discovered in lowland rainforests at the upper Kavolavata River Valley and another next to a creek in secondary forests at Kolotiana Village, Vangunu Island. And another of the genus *Brachylodes* was recorded on the slopes leading up to Mt Mariu.

Brachylodes species are abundant even in disturbed areas, except for *Brachylodes wolfi* which I only saw in primary lowland forests in the upper Kavolavata River Valley on Gatokae and on another occasion on Choiseul.

The most abundant specie of frogs are *Platymantis solomonis*. These frogs were found on all the major islands, even offshore barrier islands in the Marovo Lagoon.

Activity pattern

Most frogs were active in the early evening, between 6pm and 9pm. After this activity reduced, and frog calls recorded were lesser. Frogs tend to be more active after a light shower as well. During heavy rainfall, there was hardly any frog calls, and it was difficult to listen for activity.

Invasive species

Gatokae Island has an absence of feral pigs. This has a big impact on the flora and fauna in the rainforest understorey. The vegetation on Gatokae is very lush compared to Tetepare, Vangunu, and Kolombangara Islands.

This absence of feral pigs on Gatokae Island has an influence on the frog abundance here, and there is greater abundance of species present.

There are cane toads on all islands. This may impact the ground dwelling species, in terms of predation. However, in the upper reaches of each island, concentrations of these species are not so much.

<u>Frogs</u>	Distribution	Abundance Category in a single site at any given time (individuals)
Brachylodes elegans	Gatokae, Vangunu	between 10 to 20
Brachylodes vertebralis	Gatokae, Vangunu	between 10 to 20
Brachylodes wolffi	Gatokae	between 1 to 10
Brachylodes sp (on Mt Mariu)	Gatokae	between 1 to 10
Ceratobatrachus guentheri	Tetepare, Vangunu, Gatokae, Kolombangara	between 10 to 20
Discodeles guppyi	Tetepare, Vangunu, Gatokae, Kolombangara	between 10 to 20
Discodeles malakuna	Vangunu, Kolombangara	between 1 to 10
Platymantis solomonis	Tetepare, Vangunu, Gatokae, Kolombangara	between 10 to 20
Platymatis weberi	Tetepare, Vangunu, Gatokae, Kolombangara	between 10 to 20
Platymantis guppyi	Tetepare, Vangunu, Gatokae, Kolombangara	between 1 to 10
Platymantis sp (on Mt Mariu)	Gatokae (summit of Mt Mariu (885m) only)	between 1 to 10
Platymantis sp (Kavolavata River Valley)	Gatokae	between 1 to 10
Platymantis sp (Kolotiana Creek)	Vangunu	between 1 to 10
Rana krefftii	Vangunu	between 10 to 20
<u>Reptiles</u>		
Corucia zebrata	Tetepare, Vangunu, Gatokae, Kolombangara	between 1 to 10
Emoi	Tetepare, Vangunu, Gatokae, Kolombangara	Many Emoia skins
Salomonelaps par	Tetepare, Vangunu, Gatokae, Kolombangara	
Boiga irregularis	Tetepare, Vangunu, Gatokae, Kolombangara	
Dendrelaps solomonis	Tetepare, Kolombangara	
Crocodiles	Tetepare, Vangunu, Gatokae, Kolombangara	
<u>Mammals</u>		
Phalanger orientalis	Tetepare, Vangunu, Gatokae, Kolombangara	Presence absences indication only
Hipposideros maggietaaylorae erroris	Tetepare	Presence absences indication only
Nyctimene major	Tetepare, Vangunu, Gatokae, Kolombangara	Presence absences indication only
Melonycteris fardoulisi	Tetepare, Vangunu, Gatokae, Kolombangara	Presence absences indication only
Macroglossus minimus	Vangunu, Gatokae, Gizo	Presence absences indication only
Emballonura raffraya	Gatokae	Presence absences indication only
Pteropus rayneri	Tetepare, Vangunu, Gatokae, Kolombangara	Presence absences indication only

Key findings and highlights:

- This assessment revealed some areas of high frog diversity in the New Georgian Islands. Some of the islands that had high diversity and abundance of frogs were not the large landmasses like New Georgia and Kolombangara. For example, Gatokae Island had a remarkably high diversity of frogs relative to its size.
- A total of 14 species were recorded. This is about half of all the frog species found in the Solomon Islands.
- Some frogs in the New Georgian Islands were montane specialist which means that they are found only in cloud forests and were not found in lowland forests. One such species was discovered in the cloud forests of Mt Mariu. This particular species was only found on the summit here in a few square meters of montane forest. Species like these ones are extremely vulnerable to climate change or habitat modification. Any disturbance to the environment and the forests may kill off these species.
- Two of the four species of giant frogs, *Discodeles*, are common and widespread in the New Georgian Islands. The other two, *Discodeles opisthodon* is more common on Makira Island, and *D. buforniformis* more abundant on Choiseul Island.
- There was higher diversity of frogs found in primary lowland forests. Many of the lowland rainforests of the New Georgian Islands have been dramatically altered or cleared by logging. Many species of frogs require habitats that necessitate a high complexity of diversity for food, shelter and territory which the primary lowland rainforest provides.
- Some species such as *Litoria thesaurensis*, *Platymantis solomonis*, and *P. weberi*, are able to survive in degraded habitats.
- This survey also makes available some important frog calls of species previously unrecorded, like the calls of *Discodeles malakuna*.
- Cane toads have spread widely throughout the New Georgian Islands. This species has entered the Kavolavata River Valley on Gatokae which is about 5km inland from the coast. They are a threat to monitor lizards on the coast. However, their abundance are still not that high and this not yet impacted on the presence of monitors around the village outliers.

Breeding

Small frogs of *Discodeles guppyi* and *Platymantis weberi* were common around the upper Kavolavata River on Gatokae Island in July. None were recorded in October during a survey on Vangunu.

A cluster of eggs of *Brachylodes elegans* were also seen and photograph in July in the Kavolavata River Valley on Gatokae Island.

A female *Platymantis guppyi* with her eggs was discovered in a birds nest plant about 1m above the ground. This was my first time to observe this nesting behaviour. Clearly the breeding period for *Platymantis guppyi* is during the mid year. I am not aware if it breeds all year around. Closer, long term monitoring is required to determine this.



Eggs of *Platymantis guppyi*, in birds nest epiphyte, Kavolavata River Valley, Gatokae Island.

Other opportunistic observations

Reptiles

Apart from frogs, reptiles were also opportunistically recorded. Reptiles seen during the course of this field work included, *Corucia zebrata*, *Emoia* skinks, *Salomonelaps par*, *Boiga irregularis*, *Dendrelaps solomonis*, and crocodiles.

Mammals

Some mammals were also recorded during this survey. These were *Hipposideros maggietaaylorae erroris*, *Nyctimene major*, *Pteropus rayneri*, *Melonycteris fardoulisi*, *Macroglossus minimus*, *Emballonura raffraya*, and *Phalanger orientalis*.

Bats are generally abundant, however there are many roost sites and trees that are felled due by logging, and by villages cutting down trees to make way for gardens. Hunting is not a major problem in the New Georgian Island, and is mostly opportunistic. In the Solomons, hunting pressures on bats are more noticeable on Choiseul, Malaita, and Guadalcanal.

Some bats such as *Hipposideros maggietaaylorae erroris* are cave dwelling bats. Some caves were damaged during the large earthquake in April 2007. This cave damage not only affected the bats but in the case where streams passed through these limestone caves, *Discodeles guppyi* frogs which normally inhabited these cavern disappeared.



Monkey-tailed skink or Solomon prehensile tail skink (*Corucia zebrata*), Kavolavata River Valley, Gatokae Island.



Hipposideros maggietaaylorae erroris, Tetepare Island.

Publication outcome

As a result of this survey, I am about to publish an illustrated guide to the rainforests of western Solomon Islands.

Results of this survey will also be published in the local newspaper and in *Melanesian Geo Magazine*.

Challenges to conservation

Logging

The New Georgian Islands is a region of the Solomon Islands that has a long history of rainforest disturbance and logging by Malaysian companies. There is major concentration of logging operations here. A lot of the forests on Vangunu Island are now being removed to make way for the planting of palm oil plantations. This deforestation of the rainforest has destroyed many habitats that are important for vertebrates like frogs, birds, mammals, and reptiles.

Mining

Mining development is underway on two islands, New Georgia and Vangunu Island.

This development will have a major impact on frogs of the immediate area around the mine site and will also affect streams with dangerous chemicals. Already some frog species are declining in lowland forests of Vangunu Island, due to clearing of forests. Further chemical exposure and effluent runoff from mining operations will severely impact the frog fauna here.



Extensive logging of lowland and ridge forests on Vangunu Island.

Forests natural death

Over the past 5 years, I have been monitoring the cloud forests of Mt Rano on Kolombangara Island. The mossy cloud forest here is today drying up very rapidly and may be dying sooner than many realize. This may be due to a number of factors including global warming. Additionally, in recent years there has been large scale clearing of the lowland rainforests by logging, and many landslips above 1500m on the steep slopes due to large earthquakes, the most recent (8.1 on Richter scale) being in April 2, 2007. This deforestation of lowland forests and many landslides may have exposed the upper montane forest to warm air rising, which in turn has added in the drying up of these forests. Global warming still seems to impact these forests the most.

Conclusion

The frogs of the Solomon Islands are under heavy threat of extirpation and extinction on some islands. There needs to be firm forest management policies and conservation driven projects especially focused on the remaining pockets of lowland rainforests in the Solomons.

The New Georgian islands are high in biodiversity, and abundance of frogs. Some species are able to endure disturbance, and are able to survive even in degraded habitats. Other species will die out if nothing is done to protect the habitats that they depend on.

Some montane forests on these oceanic islands, such as on Kolombangara are drying out. It is not unclear whether this is the effect of global warming or deforestation of the surround lowland forests.

Recommendation

- Gatokae Island in the eastern New Georgia Islands is a very high area of frog diversity and abundance. The forests along the Kavolavata River Valley and up to the summit Mt Mariu area are an intact corridor that has no formal protection. The forests include high stands of old growth forests. Radial streams feed into the upper reaches of the Kavolavata River Valley which finally empties in to the northern side of the island. Cultural sites are on the upper ridges of the upper Kavolavata River Valley, and within the Biche Community Conservation Area to the south. The Biche Conservation Area on south Gatokae requires strengthening with some form of legal legislation.
- Patches of ridge forests of the north Vangunu Island and south Vangunu have some intact forest that high diversity.
- The corridor of lowland and high elevation forests of Vangunu Island are the only intact patch of rainforest left on the island. This needs some protection from logging. The urgency to have some form of protection or management plan to protect these last stands of rainforest is imperative.
- There needs to be an inventory of high elevation forests on south Vangunu.
- The high montane forests of Kolombangara Island are high in diversity of frogs. The corridors of intact forests between lowland and high elevation forests should be protected.
- Natural re-growth of the rainforests needs to take place on Kolombangara, New Georgia, Vangunu, Gatokae, and Rendova around the logged out 400m contour line to provide a buffer zone to the higher ridge forests.
- There needs to be surveys on the large islands of the central and eastern Solomon Islands such as Guadalcanal, Isabel, and the Russell and Gella group of islands, to provide an overall summary of frog data for the Solomons.

Acknowledgement

I sincerely thank RSG for supporting rainforest conservation in Solomon Islands.

Appendix

Photographs of frogs



Brachylodes vertebralis, Gatokae Island.



Brachylodes sp. Slopes of Mt Mariu Gatokae Island



Brachylodes wolffi, Gatokae Island.



Brachylodes elegans, Vangunu Island.



Platymantis sp, Upper Kavolvata River Valley
Gatokae Island.



Platymantis sp, Vangunu Island.



Platymantis weberi, Tetepare Island.



Platymantis sp, Summit of Mt Mariu, Gatokae Island.



Platymantis guppyi, Vangunu Island.



Platymantis guppyi, Gatokae Island.



Ceratobatrachus guentheri, Gatokae Island.



Ceratobatrachus guentheri, Tetepare Island.



Discodeles guppyi, Vangunu Island.



Discodeles malakuna, Vangunu Island.