

Melanesian

Geo

SPECIAL SPECIES FORUM ISSUE

Phantoms of the Forest, p34

SOLOMON ISLANDS
Species Forum, p4

SOCIETY AND THE ENVIRONMENT IN MELANESIA





Nature

Tranquility



Ocean

Culture



wildernesssolomons.com



6	Herping the final frontier	42	Seahabitats and dugongs in the Lau Lagoon
10	Community-based response to protecting biodiversity in East Kwaio, Solomon Islands	46	Herping the sunset islands
14	Leatherback turtle community monitoring	50	Freshwater secrets
18	Monkey-faced bats and flying foxes in the Western Solomon Islands	54	Freshwater hidden treasures
22	The diversity and resilience of flying foxes to logging	58	Choiseul Island: A biogeographic stepping-stone for reptiles and amphibians of the Solomon Islands
24	Feasibility studies for conserving Santa Cruz Ground-dove	64	Conservation Development
26	Network Building: Building a network to meet local and national development aspirations in Western Province	66	Chasing clouds
28	Local rangers undergo legal training	72	Tetepare's turtle rodeo and their conservation effort
30	Propagation techniques for Tubi	74	Secrets of Tetepare
34	Phantoms of the forest	76	Understanding plant & kastom knowledge on Tetepare
38	Choiseul Island: Protecting Mt Maetambe to Kolombangara River watershed	78	Grassroots approach to Marine Management
		82	Conservation in Solomon Islands: acts without actions



Cover page The newly discovered Vangunu Island endemic rat, *Uromys vika*. Image credit: Velizar Simeonovski, Field Museum.

of the priority species listed in the Critical Ecosystem Partnership Fund's investment strategy for the East Melanesian Islands.

The Critical Ecosystem Partnership Fund (CEPF) is designed to safeguard Earth's most biologically rich and threatened regions, known as biodiversity hotspots. The East Melanesian Islands, consisting of the island region of PNG (Bismark archipelago), Solomon Islands and Vanuatu, qualifies as a hotspot due to high levels of species endemism, and an accelerating loss of habitat. The latter is caused by commercial logging, mining, agricultural expansion and human population, which increase demands for resources and over-exploitation. Other threats include introduction of alien species that drive out native species and impacts of climate change.

Within the East Melanesian Islands, a diverse and unique group of flora and fauna are found which exist nowhere else on earth: 3,000 endemic vascular plants, 41 endemic mammals, 148 endemic birds, 54 endemic reptiles and 45 endemic amphibians. Notable endemic species include the majestic Solomons sea-eagle, several species of lying-fox and the giant, prehensile-tailed Solomon Islands skink.

To carry out conservation actions, we need detailed knowledge of the conservation status of individual species. According to the IUCN Red List, 308 species in the East Melanesian Islands Hotspot are threatened with extinction: 113 terrestrial species, 187 marine species and eight species found in both terrestrial and marine habitats. Many of these species are best conserved through the protection of the habitats in which they live. Sites containing these biologically important species and habitats are identified as site-level targets called Key Biodiversity Areas (KBAs). Ninety-five (95) KBAs have been defined, covering a combined land area of 29,623 square kilometres or 30 percent of the total land area of the hotspot. CEPF selected 20 priority sites from the full list of KBAs, based on a biological prioritization exercise and expert opinion. There are 5 of these in PNG, 9 in Solomon Islands and 6 in Vanuatu, covering a total area of 15,000 square kilometres. In addition, 48 priority species were been selected from the full list of globally threatened species: 20 mammals, 11 birds, 5 reptiles, 2 amphibians and 10 plants. The purpose of selecting priority species is to enable investments in species-focused conservation action whose conservation needs cannot adequately be addressed by habitat protection alone.

In this issue there are articles that highlight not only the exceptional biodiversity treasures of the Solomon Islands Archipelago, but also the development opportunities that may help save these last biological hotspots.

There are also articles that explore the archipelago's rich treasures by researchers. Many of which occur in the KBAs that we at CEPF support. I hope you find the articles beneficial, are inspired by the diversity of this region and the various organisations that are working tirelessly to save these forests and seas.



Helen Pippard, Guest Editorial
Critical Ecosystems Partnership Fund (CEPF)
Project Manager, IUCN Oceania, Fiji

We are delighted to bring you this special edition of *Melanesian Geo*; a compilation of work presented at the inaugural National Resource Management Symposium held in Honiara in October 2017. As part of this event, a Solomon Islands Species Forum was hosted by Ecological Solutions Solomon Islands and IUCN Oceania, bringing together Solomon Islanders working on species conservation, celebrating the species of Solomon Islands, and promoting species research, protection, management, recovery and rehabilitation.

In recent years, IUCN Oceania and partners have been working to improve the visibility of species conservation in the Pacific Islands. In 2012, the inaugural Pacific Islands Species Forum was held in Honiara, which included a day focused on the biodiversity of Solomon Islands – the Solomon Islands Biodiversity and Species Conservation Management Forum. The forum urged Pacific Islanders to “value and make every effort to understand the various plants, animals and natural environments that make up our island homes”.

In 2014, a species conservation symposium was held during the Society for Conservation Biology (Oceania) conference hosted at the University of the South Pacific. A major outcome of this was a special issue of the *Pacific Conservation Biology Journal*, titled “Species Conservation in the Pacific Islands: taking effective steps forward”. The symposium was convened by members of the Species Working Group of the Pacific Islands Roundtable for Nature Conservation, highlighting species conservation priorities and promoting collaboration amongst Pacific Islanders working in species conservation.

In line with moving from science to action, and continuing to raise awareness of species and research, a second Pacific Islands Species Forum was held in Suva in 2015.

The focus of the 2017 Solomon Islands Species Forum was predominantly on research and conservation



PRODUCTION TEAM

Founder/Editor: Patrick Pikacha
patrick.pikacha@gmail.com
Assistant editor: Tamara Osborne
osborne.tamara@gmail.com
Contributing editor: David Boseto
dboseto@gmail.com
Prepress layout: Patrick Pikacha

ADVERTISING & DISTRIBUTION

Email: patrick.pikacha@gmail.com

CONTACT ADDRESS

PO Box R63, Ranadi,
East Honiara, Solomon Islands

SUBSCRIPTION

A free pdf copy is available via email.
Email: dboseto@gmail.com;
osborne.tamara@gmail.com; or
patrick.pikacha@gmail.com or
by logging on to melanesiangeo.com

MELANESIAN GEO is a grassroots magazine of society and the environment in Melanesia.

PUBLISHER

Melanesian Geo Publications
PO Box R63, Ranadi, East Honiara
Solomon Islands

All article contributions may be send to:

The Editor, PO Box R63, Ranadi,
Honiara, Solomon Islands (or) by
Email to
patrick.pikacha@gmail.com

PLEASE NOTE THAT UNSOLICITED MANUSCRIPTS ARE ACCEPTED AND SUBJECT TO REVIEW.

All submissions may be sent to:
The Editor
MELANESIAN GEO
PO Box R63, Ranadi,
Honiara, Solomon Islands

or by email to:

osborne.tamara@gmail.com (or)
patrick.pikacha@gmail.com

The articles and views conveyed by the writers are their own, and do not necessarily represent those held by the publisher and editor. Articles included in this publication may be accurate only at the occasion it was first acquired from the writers. Thus some articles may be changed whenever and with no notification.

MELANESIAN GEO is published at least two times a year for the purpose of dissemination of important issues affecting society and the environment in Melanesia.

Government Of Solomon Islands Hails Barana Community Nature Park Initiative



An initiative to establish a nature park in the Barana area on Mt Austen, outside Honiara town championed by the people of Barana in partnership with the Secretariat of the Pacific Regional Environment Programme (SPREP) through the Pacific Ecosystem-based Adaptation to Climate Change (PEBACC) project has received much praise from the Solomon Islands Government.

Addressing the Barana community on World Environment Day, 5 June 2018, Permanent Secretary for Environment, Climate Change, Disaster Management and Meteorology (MECDM) Dr. Melchoir Mataka hailed the efforts saying it is encouraging to see a shift towards not only protected areas but sustainable natural resources management at both provincial and community levels.

“The establishment of a community nature park is part and parcel of the government’s efforts to promote environmental management and sustainable natural resources management throughout the country.

“I would also like to urge the community of Barana and Guadalcanal province to take ownership of the community nature park that SPREP through the PEBACC project is establishing here at Barana.

“The SPREP PEBACC project will only be here for a limited time and the community and the province will need to think about the long-term sustainability of the work. It requires strong commitment, honesty, accountability and hard work by all members of the community with support from both the national and provincial government. All of us here must take ownership of this project.” Dr Mataka said.

The Premier of Guadalcanal Province, Mr Anthony Veke was also a guest at the event and he reiterated that the project is not just about climate change resilience for Barana but also for Honiara city as a whole.

“I note with interest the focus on ecosystems and services such as water, forests, good soil and stability of the natural environment. All these services support the livelihood of the people of Barana and



Solomon Islanders and international researchers working on species conservation came together to celebrate the species of Solomon Islands, and promote species protection, management, recovery and rehabilitation. The day provided a platform for science practitioners and field biologists to showcase their current research and management efforts.

The focus was predominantly on activities related to the priority species listed in the CEPF investment strategy for Solomon Islands, targeting past and current recipients of CEPF funding to present and share valuable lessons from their work.

Over 200 attendees made their way to the Solomon Islands National University for the Species Forum. The venue was chosen in order to promote partnership between NGOs and this academic institution, as well as acknowledge the new partnership with CEPF, with SINU undertaking a large grant for work to incorporate biodiversity conservation into its curriculum.

Presentations and discussions showcased work on species as diverse as bats, frogs, turtles, freshwater and marine fishes as well as the management and storage of data, how to deal with threats to species, and how best to carry out species recovery plans.

As part of the Species Forum, a photo competition was held, encouraging submissions on the theme “Celebrating the Wildlife of Solomon Islands”. The winning image was by Tyrone Lavery, currently of the Field Museum, Chicago, of his image of *Litoria lutea*, Solomon Islands Tree Frog, one of CEPF’s Priority Species.

Honiara.” Mr Veke said.

According to PEBACC Solomon Islands Country Manager, Fred Patison, the Barana community nature park is an initiative to promote ecosystem-based adaptation to climate, re-enforcing the role of nature to strengthen community resilience to climate change.

“It is encouraging to see a community in Guadalcanal standing up to take action on a critical environmental issue. Our communities must be guided to see the important functions of these ecosystems and their preservation for our needs and survival today and into the future.

“PEBACC sees this as an opportunity to work with the community to address environmental sustainability.

“Let me convey to the Barana community that SPREP and the other partners are here only to re-enforce the messages of environmental protection, restoration and so forth. Your commitment and support now is your investment in yourselves, your children and your future.” Mr Patison added.

World Environment Day celebration at Barana community was a success with an official ceremony in the morning followed by tree planting, a clean-up around the community and the school and a hike to the Barana nature park.

PEBACC is a five-year project implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) in partnership with the governments of Fiji, Solomon Islands and Vanuatu. The project is funded by the International Climate Initiative (IKI) administered by the German Federal Ministry for the Environment, Nature Conservation and Building (BMU).

The Project focuses on strengthening and protecting the role of natural ecosystem services to enhance resilience to climate change. In Solomon Islands the project is working in Wagina Island and Honiara.

For more information about the PEBACC project in Solomon Islands, contact Mr Fred Patison, PEBACC Solomon Islands Country Manager at fredp@sprep.org



Ma'asina Greenbelt,
Malaita Province

Herping

the final frontier

Finding frogs and reptiles in the last untouched forests on Malaita Island

WORDS AND PHOTOGRAPHS BY [Edgar Pollard](#)





Ring-tailed gecko, *Cytodactylus salomonis*.

It's 11pm and the only sounds that interrupt our steady trudge through the light rain are the regular chorus of frogs and the occasional hooting of an owl. None of us are talking now, wet and tired, just counting our steps back to camp where a hot cup of sweet tea awaits.

We are on a ridge in the middle of the island of Malaita, the second largest island in the Solomon's and the most populated. We are undertaking research as part of my Master's degree, looking at frogs and lizards in different forest habitat types. The majority of Malaita's forests have already been degraded due to logging activities, agricultural cultivation to meet the demand of a rapidly expanding population, and soon-to-be oil palm plantations. However there are pockets of pristine forest left and we are in one of these in the 'Are'Are region.

We wait for the sun to set before setting out on our transect walks. As the light dims, the croaking rise from the soft, cold blooded amphibians. Despite the generally low frog diversity on the island of Malaita there is still a good variety of calls to be heard, from the high pitched peeping of the Fauro sticky-toed frog to the much lower pitched, knocking, *toh toh toh* of the Solomon Islands giant tree-frog, to the almost puppy-like yapping of the beautiful Solomon Island's eyelash frog. Due to the general abundance of these creatures they aren't too hard to find. However we still need a trained ear to determine the direction and distance of a call, and a quick movement of the hand is vital to be able to catch these frogs for closer inspection.

Malaita has 8 native frogs that are endemic to the Solomon Islands. These frogs are forest specialists and can also be said to be relatively good indicators of forest health. Therefore the plight of these beautiful creatures is very much dependent on the health of the ecosystems that they live in.

The aim of our project was to determine conservation priorities, forest habitats based on herpetofaunal richness, and the status of cultural knowledge. This involved nocturnal transect walks and diurnal quadrat stations in five different forest habitats, and interviewing local people for associated knowledge on forests and herpetofauna.

Our major findings are that unlogged lowland forests are the priority conservation forest habitat type on the island of Malaita, and that traditional knowledge is endangered as seen in the big difference in knowledge between the elder and younger generations.

To be sustainable and long lasting, conservation needs to be a mix of scientific and traditional knowledge in the Pacific. Community participation is vital to the longevity of any project in the Pacific Islands, not just conservation related-efforts. The danger of losing our traditional knowledge of our environment can be prevented and rejuvenated for future generations through community participation, knowledge sharing and documentation. Perhaps this is one thing

Malaita has 8 native frogs that are endemic to the Solomon Islands. These frogs are forest specialists and can also be said to be relatively good indicators of forest health.



that donors and scientists need to understand whilst engaging traditional communities in conservation efforts. And that is in terms of achieving any conservation outcome, science has at times very little to play by way of convincing communities to protect ecosystems or species. Conservation needs to first understand the needs of the community, the traditional and spiritual connections of people to place, and the way they interact with the environment. This requires a multidisciplinary approach to approaching conservation and resource management issues.

There was also a sad aspect to our adventure. The forests that were our home for a combined time of roughly 12 weeks are currently earmarked to be turned into oil palm plantations. These monoculture systems will undoubtedly result in the loss of our native frogs, not to mention bring an increased abundance of the invasive cane toad, an invasive species that comes hand in hand with land conversion and development. Globally palm oil is the major cause of deforestation in tropical equatorial countries, with some experts estimating that they cover 27 million hectares of the earth's surface. That is an astounding expanse of palm oil and resulting forest loss.

An exciting outcome of our research is the establishment of a community conservation area that would at least provide a small sanctuary for all the beautiful creatures of the forest especially our beloved frogs. We have proposed the establishment of the Harurarumu and Torohane Conservation areas, covering over 1000 hectares of pristine lowland and upland tropical rainforests. Establishing these areas will not only cater to protecting priority biodiversity such as the frogs and lizards, but will also contribute to the traditional needs of local communities, such as sourcing wild foods, hunting pigs and traditional building materials - activities that would all cease if logging and oil palm companies have their way.

We would like to thank the University of the South Pacific's research office for making this research possible through funding. We would also like to acknowledge the local landowners of the forests and especially the local tour guides who endured discomfort, the wet, the cold and momentary hunger. The proposed Harurarumu and Torohane Conservation Areas are located in the 'Are'Are highlands at roughly a couple of hours trek from Waisisi harbour on the coast. Ships travel from Honiara once a week. Local guides welcome researchers and tourists.

For more information contact Edgar on edgarjmp@gmail.com. If you want to help save the last forests of Malaita please also contact the author with any ideas.

Edgar Pollard is a biomedical researcher and vertebrate ecologist. He is currently completing a doctoral degree in biomedicine studying malaria mosquitoes. He is also an integral member of the Ma'asina Greenbelt a grassroots initiative on the island of Malaita, mandated to conserve and manage natural resources.



The well camouflaged Solomon's eyelash frog, *Corufer guentheri* (top left). Endemic Solomon ground frog, *Corufer solomonis* (top). Endemic Prehensile tailed skink, *Corucia zebrata*, (above centre) largest arboreal skink in the world. Solomons blue-tailed skink, *Emoia pseudocyanura* (above).



Ma'asina Greenbelt,
Malaita Province

Community-Based Responses to Protecting Biodiversity in East Kwaio, Solomon Islands

The people of East Kwaio, Malaita, retain many indigenous traditions that have been lost in other parts of the Solomon Islands. The Kwainaa`isi Cultural Centre which was built to preserve the Kwaio culture is located in the central mountains at about 920 metres. To get there it takes about 5 to 8 hours hiking from the coast. Since its establishment in 2016, the centre has been at the forefront of retaining and disseminating cultural knowledge in the area, and ensuring that any research carried out there is culturally appropriate.

WORDS BY [Tommy Esau](#)
PHOTOGRAPHS BY [Ben speare](#),
[Fo`oori Sedawasi](#), [Esau Kekeubata](#),
and [Tommy Esau & Tyrone Lavery](#)

Sango dancing group from Kwainaa`isi performing at Atoifi





The work of building a collection of cultural and historical materials started about 40 years ago, in 1979, at the original Kwaio Cultural Centre. Many Kwaio people have deep and profound knowledge of plants and animals. Here the community has resisted attempts to introduce logging and large-scale agriculture onto their land. The aim of the Kwainaa'isi Cultural Centre project is to build research capacity among Kwaio people and to document and preserve knowledge of local culture and history, and develop and strengthen approaches to conserving Malaita's highland rainforests.

Kwainaa'isi has taken a "learn-by-doing" approach to capacity building through a series of collaborative workshops and also practical fieldwork. Representatives from the Centre have attended workshops in



Since its humble beginning in 2016, the organisation has now established a Culture School with two full-time teachers who teach basic arithmetic, reading and writing, and twelve instructors who teach Kwaio culture, and indigenous music and arts.

Solomon Islands, Bougainville and Lumi at Tenkile conservation Alliance in Papua New Guinea, and at the Australian Tropical Herbarium at James Cook University and the Australian Museum. Workshops have highlighted methods of plant collection and preservation, plant photography, systems of cultural exchange, conservation area mapping, surveying fauna, video editing and organisational management.

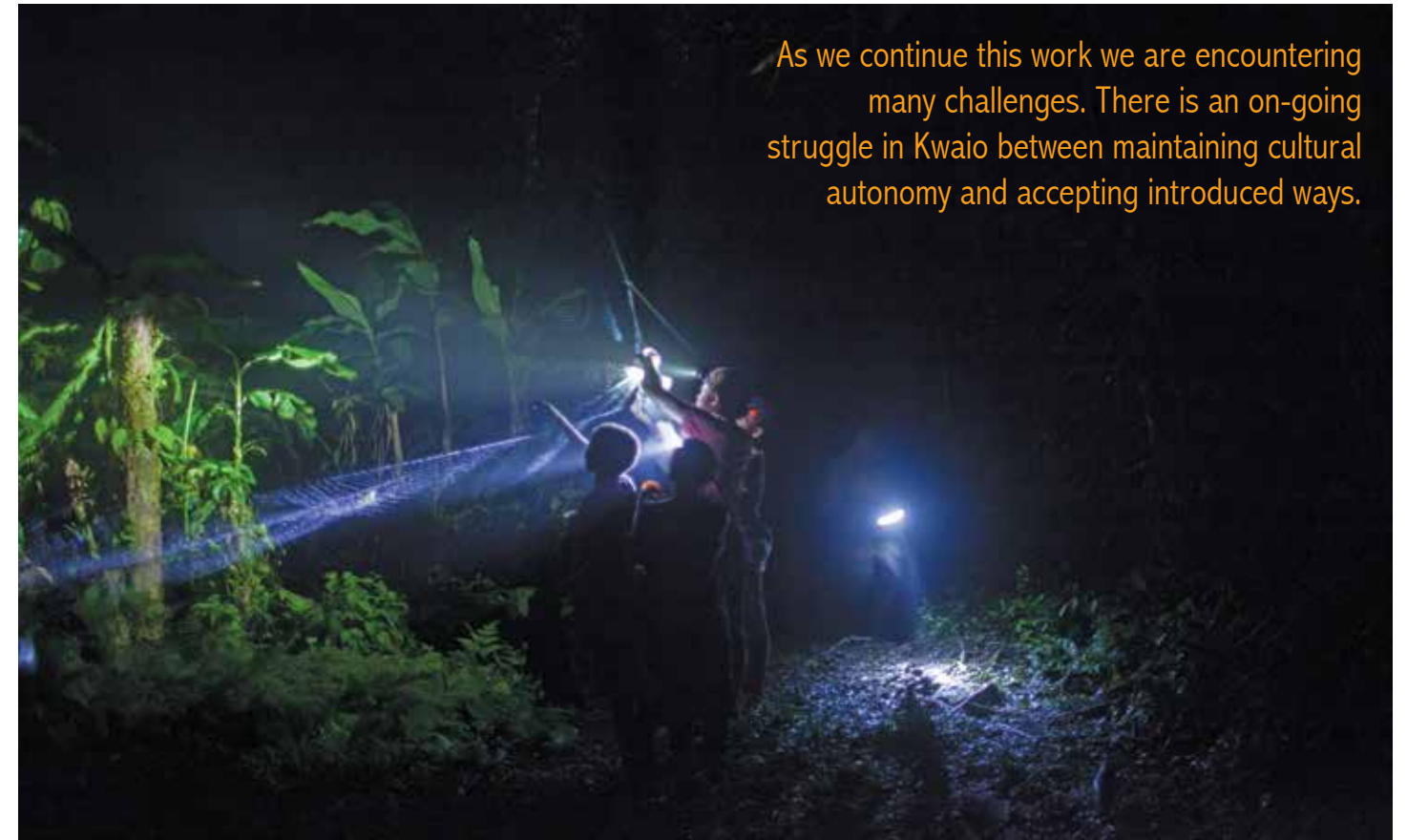
With the partnership and support from the Critical Ecosystem partnership fund (CEFP), International Union for Conservation of Nature (IUCN), and the Australian Museum, the Centre has produced a booklet and 15 accompanying video segments on plants that Kwaio people use for medicine and food. Capacity is being built in video editing and plant collection and preservation in partnership with Tropical Health Solutions and the Australian Tropical Herbarium. In 2016,

Above Kwainaa'isi media crews learning skills on photography at Kwainaa'isi Cultural Centre. Below Chief Esau talking about his plans for conserving Malaitan culture and biodiversity.

the team carried out what we believe is the first high-elevation mammal survey of Malaita. We documented signs of an undescribed species of giant rat, a new species record (the bare-rumped sheath-tail bat), and the monkey-faced bat for Malaita. Local, national, regional and international networks were established as a result of this work. All data collected will be archived and maintained at the Cultural Centre.

As we continue this work we are encountering many challenges. There is an on-going struggle in Kwaio between maintaining cultural autonomy and accepting introduced ways. The area is remote from urban centres and lacks access to education, health services and road transportation. People fear harmful government intrusion and outsider-driven development. Nonetheless, the Kwaio community is enthusiastic about the Centre. Our approach has been to start small and slowly build, and our motto is, 'Small is beautiful and valuable'.

Since its humble beginning in 2016, the organisation has now established a Culture School with two full-time teachers who teach basic arithmetic, reading and writing, and twelve instructors who teach



As we continue this work we are encountering many challenges. There is an on-going struggle in Kwaio between maintaining cultural autonomy and accepting introduced ways.



Kwaio culture, including indigenous music and arts. Our Kwaio Archive holds almost 120,000 files of documents, pictures, videos, and histories about Kwaio, Malaita, and the Solomons and beyond. We have held and will continue to hold computer training workshops and we are also training rangers to carry out conservation work. We have conducted a major awareness program in four districts in East Kwaio in order to engage communities, churches and schools to get them involved in the work. Two lectures in Honiara have engaged urban residents from East Kwaio and also the broader public.

The study team has maintained

great enthusiasm. In addition to the aforementioned booklet and videos, specimens from various plants are preserved at the Centre. We have mapped the first of three East Kwaio conservation areas. Our work on camera trapping and animal monitoring is ongoing. The project has demonstrated an impressive capacity among Kwaio people to document plants and animals on their tribal lands and strengthen conservation in their area.

Tommy Esau is a tribal member of the Kwainaa'isi Cultural group and a coordinator and researcher, partnering with research institutions such as James Cook University and Australian Museum. He is an integral member of the Ma'asina Greenbelt Initiative.



Left Members of Kwainaa'isi -Fo'oori and Maasafi learning plant pressing and preservation skill with Frank Zich at Australian Tropical Herbarium, James Cook University, Cairns in Australia. Above Laeringi talking about Fa'amuku plant uses to cure diarrhoea and other diseases. Top Kwainaa'isi rangers collecting flying fox from mist net during one of the survey at Kwainaa'isi July, 2016.



Ma'asina Greenbelt,
Malaita Province



Leatherback Turtle Community Monitoring

Small Steps to Global Impacts

WORDS BY [Ben Namu](#) & [Felix Naitoro](#)

PHOTOGRAPHS BY [Felix Naitoro](#)



Above Leatherback turtle hatchling, Waisurione, Malaita Province. **Below** The new entrance noticeboard to the protected beach area.

When dusk falls, and you are called to take on the night shift patrolling the leatherback beaches, there is no time for excuses. With a passion to ensure that mankind and nature live in harmony, rangers of Wai-Hau Conservation Area eagerly conduct night patrols.

Their mandate is to protect the leatherback turtle (*Dermochelys coriacea*) within Wai-Hau Conservation Area, west Are'Are, Malaita. It is the work that the Wai-Hau Conservation Foundation has been doing seasonally for almost 4 years. From a humble beginning, this community-led initiative has taken large steps to conserve what are some of the last nesting beach sites on the island of Malaita.

The leatherback turtle is classed as Endangered on the IUCN Red List, with populations across its global range facing



Our history has not always been about conserving turtles. For decades, these magnificent turtles, largest in the world, were once a source of protein for people living along the coast from Wairaha and Hauhui villages.

a high probability of extinction due to fisheries interactions, direct harvest (of turtles and eggs/nests), predation, and habitat degradation. Based on published estimates of nesting female abundance, leatherback populations are declining at all major Pacific basin nesting beaches.

The beach we manage on West Are'Are, is unique for having long extents of black sand with no outer or inshore reef systems. For these reasons, they are the ideal breeding habitat for leatherback turtles. For a while now, this beach at Waisurione, and its neighboring villages, has been known as an important breeding rookery for two leatherback populations. One population of the northern hemisphere summer breeds from June to September while a winter population lay their eggs from October till January.

Our history has not always been about

conserving turtles. For decades, these magnificent turtles, largest in the world, were once a source of protein for people living along the coast from Wairaha and Hauhui villages. Leatherback turtles were once an important cuisine during Christmas feasts and other social gatherings. As a result of these harvests, the population of nesting turtles has taken a steep dive in the past 20 years. Poaching by animals and humans for their eggs, entanglement in fishing nets, and beach erosion caused by persistent sea level rise have been key contributing factors for decline in turtle numbers. For management and recovery efforts to be effective, obtaining accurate estimates of current abundance (population records) and distribution at critical habitats is essential.

Despite turtles coming up on our beach to nest for decades, the outside world, and environmental organizations working within the Solomon Islands, hadn't heard of our site. Not until 2002, when a female leatherback turtle fitted with a satellite tag on her back came up the beach to nest. This particular female turtle was monitored by The Nature Conservancy (TNC). This finding confirmed to those concerned with conserving turtles that they indeed did breed in West Are'Are,



Above Wau-Hau rangers working to relocate a leatherback nest. Nesting relocation gives a greater nest success for turtle hatchlings.

Rangers have been trained and equipped with the necessary knowledge of leatherback turtle data collection protocols. This includes data collection for genetic samples, tagging, GPS training, and other leadership and management training.

and gave us the exposure needed.

With this new information, a scoping trip was carried out by Dr. Nick Pilcher from Marine Research Foundation (MRF), a Malaysian based NGO. The purpose of the trip was to identify new sites that could potentially contribute data for this endangered species. When the Wai-Hau site was selected, in 2014 and 2015, MRF in association with Wai-Hau Conservation developed and conducted the first monitoring and recovery project called "Capacity Building to Enhance Leatherback Sea Turtle Conservation in Solomon Islands".

The initial stage of the project was focused mainly, and importantly, on the summer nesting turtle population, as there was very little known of this population. Scientists believe the summer population could possibly be distinct genetically and behaviorally from the winter population.

With the results that stemmed from this initial project, and the experience garnered by passionate rangers and managers, Wai-Hau Conservation Foundation was then funded by Critical Ecosystem Partnership Foundation (CEPF) and International Union for Conservation of Nature (IUCN) to further its conservation efforts.

Over the years, Wai-Hau rangers and

staff have benefited from partnerships developed with other organizations. Rangers have been trained and equipped with the necessary knowledge of leatherback turtle data collection protocols. This includes data collection for genetic samples, tagging, GPS training, and other leadership and management training. Nearly all rangers are also affiliated members of Solomon Islands Rangers Association (SIRA). Over the years, the passion exhibited by rangers and villagers to protect leatherbacks has inspired surrounding communities and villagers to become more environmentally conscious.

From small beginnings, our conservation efforts have now expanded to protecting rainforest ecosystems. Yet our core conservation effort is still targeted towards protecting the ever-elusive leatherback turtle. We are taking small steps in this remote part of Malaita Island, hoping it will sequentially contribute to a happy ending for our nesting turtles, and have positive impacts for this global traveler.

Ben Namo and Felix Naitoro are founding members of Wai-Hau Conservation Foundation. The organisation works in West Are'Are, and is a key biodiversity organisation on the island of Malaita. Both are key members of the Ma'asina Greenbelt Initiative.

MONKEY-FACED BATS AND FLYING FOXES IN THE WESTERN SOLOMON ISLANDS

WORDS BY Tyrone Lavery, Corzzierah Posala, Liz Tasker and Diana Fisher

PHOTOGRAPHS BY Tyrone Lavery, Corzzierah Posala, Fitzclarence Dukitaba, Patrick Pikacha

The use of indigenous language names for the scientific names of species is a great way of recognising traditional knowledge of species by indigenous people. When Harry Parnaby described the New Georgia monkey-faced bat for western science in 2002, he incorporated the Vangunu language name ('tagi', sometimes pronounced 'taki', or 'tangi') into the species name (*Pteralopex taki*). In 1992, the species was yet to be described, when Diana Fisher and Liz Tasker from the Australian Museum Pacific Island expedition team (overseen by Tim Flannery) headed for Seghe Airstrip, Western Province, Solomon Islands to begin what remains today the only published ecological study focused on a species of Solomon Island mammal.

Monkey-faced bats (genus *Pteralopex*) are unique to the geographic Solomon Islands (including Bougainville and Buka). They are medium sized fruit bats with small ears, robust jaws and large eyes, characters that to some resemble a monkey. All five known species are recognized as either critically endangered, or endangered under the IUCN RedList (the world's most trusted and comprehensive authority on species conservation status). Tagi can be found only on New Georgia and Vangunu Islands in the Western Province of the Solomon Islands, and nowhere else on earth. When Diana and Liz set off to study the species, very little was known about the ecology or life history of any monkey-faced bat. The two researchers visited eight sites over a period

of three months, surveying for the bat using fine 'mist nets'. At four of these sites they found tagi, tracked their movements and looked at their feeding behaviour and diet. This study, combined with an existing traditional knowledge, helped reveal some interesting characteristics. By day, tagi rest in small groups inside hollow trees and big strangler figs or abalolo trees. They return to these same trees repeatedly. After the sun sets, the bats venture out to feed on forest and garden fruits as well as harder materials such as nuts. Importantly, it was found that they prefer to roost where there are ruins of former village sites, where ngali nuts and wild cut nuts are common.

More recently, Corzzierah and Tyrone have returned to repeat Diana and Liz's surveys. In the 22 year interval between 1992 and now, there have been big changes in the Western Province. Human populations have greatly increased, and industrial logging has all but exhausted the forests of Vangunu and New Georgia. We are concerned that the logging in particular, may have had a big impact on tagi. Evidence uncovered by Diana and Liz suggested that the species once occurred on Kolombangara, but following the removal of native forests below 400m altitude, it appears the species is now extinct on that island. Using mist nets positioned at these same eight sites, Tyrone and Corzzierah are aiming to find out how tagi and other flying foxes are faring on New Georgia and Vangunu, and whether there have been any population changes since 1992. The existing traditional



New Georgia monkey-faced bats are threatened by deforestation caused mainly by logging. The ideal habitat are mature lowland forest close to stands of fruiting trees and strangler figs (top, above), for example old village sites. Guadacanal Monkey-faced Bat (*Pteralopex atrata*) (above centre), and New Georgia monkey-faced bat (*P. taki*) (above).



New Georgia monkey-faced bat (*Pteralopex taki*). This is an uncommon species. It is least frequently netted species in the New Georgian Islands.

knowledge and oral culture of the Solomon Islands are some of the joys of working in this part of the world. Although it is 22 years since Diana and Liz were at these sites, we are told many stories of the work they undertook when they were in Marovo Lagoon. Locating their original sites is also made easy. On most occasions we are lead straight to the exact locations where nets were positioned in 1992. Sometimes by boys that are less than 22 years old!

In addition to the sites surveyed by Diana and Liz, we are also looking in other parts of Vangunu and New Georgia, and on further islands to try and find tagi. Searching tree hollows with the help of local hunters is an important part of this. At Zaira, on the weather coast of Vangunu, we successfully recorded tagi using this technique. We were working at the edge of an old village site within the community protected area managed by Zaira, when one of our team members climbed a big stranger fig to check for tagi. Checking the holes in the trunk as he went, after reaching 15 metres from the ground he indicated that he didn't think anything was inside. We were certain something must be. It was such an ideal roost tree for tagi, and it was also in an ideal location, close to ngali nut trees and a short distance from village gardens. So a second climber began to follow, climbing the other side of the tree and checking each of the many holes with his head torch as he went.

Suddenly, after reaching only five metres above the ground something began to stir. First a scrambling flash of movement went past the inside of a hole two metres above the climber, then again past a second hole only a metre above. Something was coming, but what? Many species share hollow trees with tagi. It could be a southern common cuscus (or kandora) (*Phalanger orientalis breviceps*), another species of flying fox such as Solomon flying-fox (*Pteropus rayneri*), or dwarf flying-fox (*Pteropus woodfordi*) or even a giant prehensile-tailed skink (*Corucia zebrata*). Suddenly, like a can of soft drink from a vending machine, a small flying fox with mottled wings and red eyes rolled out of a third, lower hole at the climber's feet. It lay there gazing up at him and was casually picked up and placed into a calico bag for measuring. This is not unusual for tagi, they like all monkey-faced bats are quite a gentle species compared with most of flying-foxes. They are easy to handle, and do not attempt to bite as species of *Pteropus* (the group to which most flying foxes belong) tend to do.

The Solomon Islands support many species of flying fox, most of which are not found outside of the region. Many of these are caught in our mist nets when we are searching for tagi. This includes larger species of flying-fox, such as Solomons flying-fox and Admiralty's flying-fox (*Pteropus admiraltatum*), Solomon's bare-backed fruit bat (*Dobsonia inermis*) and



the unique dwarf flying-fox (*Pteropus woodfordi*). We also catch many smaller species of tube-nosed and blossom bats such as Solomon tube-nosed bat (*Nyctimene bougainville*), island tube-nosed bat (*Nyctimene major*), northern blossom bat (*Macroglossus minimus*), Fardoulisi's blossom-bat (*Melonycteris fardoulisi*), and Rousette Bat (*Rousettus amplexicaudatus*). All of these species are important to the forests of the Solomon Islands. They pollinate the flowers of many species of plant, allowing them to develop into seeds. When bats eat fruits, they deposit the seeds in their droppings, spreading plants among the islands and assisting the forest to regenerate in areas where it has been damaged. Our surveys will allow us to assess the populations of many species of flying fox and look for any changes that have occurred since 1992. This is a unique opportunity in a region where little is known about the biology of flying-foxes.

The good news is that in 2014 we have



again recorded tagi in some of the sites surveyed in 1992. It remains a rare species, at most places we are able to find only one or two individuals. We were also happy to see that of the four sites where Diana and Liz caught the species, only one has been disturbed by a logging company. However, we are concerned that another two may be logged very soon. This makes it urgent for us to find out whether or not tagi can still live in forests that have been disturbed by logging. We are keen to know if leaving large strangler figs standing in logged areas and around villages might enable this species to persist. If not, tagi may decline to small community protected areas, or even disappear in coming decades as logging continues in the Western Province.

Tyrone Lavery is a researcher at Kansas University, USA. Corzzierah Posala worked for the program of Solomon Islands Community Conservation Partnership, Solomon Islands. Liz Tasker works for the NSW Office of Environment Heritage, Australia. Diana Fisher is Associate Professor in School of Biological Sciences at the University of Queensland, Australia.



Zaira village and its surrounding forests (top) are some of the last forests on Vangunu Island where New Georgia Monkey-faced bat (*Pteralopex taki*) are found. Solomon's naked-backed fruit bat (*Dobsonia inermis*) (above) endemic to Solomon Islands. Fardoulisi's blossom-bat (*Melonycteris fardoulisi*) (insert left), Rousette bat (*Rousettus amplexicaudatus*) (insert right).

The diversity and resilience of flying foxes to logging

WORDS BY Diana Fisher

PHOTOGRAPHS BY Diana Fisher & Tyrone Lavery

My introduction to Solomon Islands flying foxes- the New Georgia Monkey faced bat

I first travelled to the Solomon Islands in 1992, when the Australian Museum sent my 22 year old self, together with another student friend, to try to find out something about the New Georgia Monkey faced bat in Western Province. This was part of a set of expeditions in the Pacific organised by Tim Flannery, who was the curator of mammals at the museum. The year before, a member of the museum team had been the first scientist to see this species of flying fox and realise that it was a new species, not described scientifically before. Tim has since become very well known in Australia for writing books and making documentaries about nature, history and climate change (including a book about these Solomon Islands' natural history expeditions: 'Among the Islands: Adventures in the Pacific'), but at that time, he was a young mammalogist keen to discover more about Melanesian natural history.

We now know that there are at least 25 species of nectar- and fruit-eating bats in the Solomon Islands. These range from the 6 cm long *Macroglossus* blossom bats which eat nectar from flowers and tend to be solitary, to the 250 cm long fruit-eating, social *Pteropus* flying foxes such as the Solomon Islands flying fox. More than half of these species are listed as threatened with extinction by International Union for Conservation of Nature (IUCN). A third of the threatened flying foxes are monkey faced bats of the genus *Pteralopex*. This genus is only found in the Solomon Islands and Bougainville.

Since the 1990s, the New Georgia Monkey-faced bat has been formally described as *Pteralopex taki*, and given the alternative common name 'taki'. Taki (or tangi) is one of the two local language names for the species around Marovo (the other name is 'girave').

In the 1990s, logging was not as widespread in the Solomon Islands. No logging was evident in most of the Marovo Lagoon region, where we began our trip back in 1992. The type locality where the New Georgia monkey-faced bat was first recorded by the Australian Museum was near Seghe, on the eastern coast of New Georgia

island. The habitat here was intact lowland rainforest with some historic village kastom sites, where there were huge 'abololo' or fig trees, ngali nuts and other canopy trees with hollows for bats and cuscus to shelter. There were modest areas of gardens along the coast. We found this rare flying fox in four of the places we searched on New Georgia and Vangunu. It seemed to be endemic to a small area around Marovo Lagoon, like the other four species in the genus *Pteralopex*, which are all restricted to one or two islands in either lowland or highland old growth rainforest. In the last two decades however, Western Province has become one of the most heavily logged parts of Melanesia. At the first IUCN Species Forum held in Honiara in 2012, I was worried to hear that all of the places where we

Studies in other parts of the world such as south east Asia suggest that bats can tolerate selective logging better than many other animals. However, tropical mammals with small ranges are often threatened, and are not resilient to the loss of old growth forest, especially if they are island endemics, eat fruit, and rely on tree hollows.

had recorded the New Georgia Monkey-faced bat were probably logged or under logging agreements.

Studies in other parts of the world such as south east Asia suggest that bats can tolerate selective logging better than many other animals. However, tropical mammals with small ranges are often threatened, and are not resilient to the loss of old growth forest, especially if they are island endemics, eat fruit, and rely on tree hollows.

Since 2012, I have been lucky to be able to support several Solomon Islands' students working on conservation projects, supported by Critical Ecosystem Partnership Fund (CEPF) and other sources, through the University of Queensland and also the University of the South Pacific (in collaboration with Dr Gilianne Brodie). The first of these projects that Australian postdoc Dr Tyrone Lavery, Solomon Islander MSc student Corzzierrah Posala and I were involved in after the many years away from the Solomon Islands, was to go back to

Western province to see if the monkey-faced bat was still surviving. We re-surveyed the past sites to see if *Pteralopex taki* and the other ten species of flying foxes that we had recorded had persisted or declined since 1992. Some of these other species are widespread in the Solomons, PNG and even Asia, and some are restricted to parts of the Solomon Islands Archipelago. To try to understand if any declines of these different flying foxes were related to logging in the 25 years between the two visits, we looked at the extent of logging at several scales (3ha, 30, 300, 3000 and 30000 ha) and tested if capture rates of flying foxes declined with logging at each scale, accounting for island size.

We found that all of the widespread species have stayed the same or increased in abundance since 1992. These flying foxes are surprisingly resilient to the amount of logging that has happened in Western Province, and it seems that they can live in regrown forest. However, the two species with the most restricted ranges - Fardoulis Blossom bat *Melonycteris fardoulisi* and the New Georgia Monkey faced bat, *Pteralopex taki* have declined as a result of logging. We were very

concerned to find that captures of the endemic blossom bat have plummeted by 75%. This animal is not listed as threatened, but because of the strong correlation between increased logging and this rate of decline, we strongly suggest that its listing is reviewed. The blossom bat responded at a large scale of logging, and the taki was sensitive to local scale logging.

We did not find the taki on Kolombangara in the 1990s, and we were told that it may be extinct there. In 2015 I received the excellent news that Tyrone and colleagues from Kolombangara Island Biodiversity and Conservation Association (KIBCA) had rediscovered the species in the lowlands of Kolombangara in a small patch of abololo. This further shows that this species can tolerate some habitat fragmentation and second-growth forest, as long as enough roost trees remain. The taki has now been changed to Vulnerable from Endangered in the Red List due to the new knowledge of it on Kolombangara.



New Georgia monkey-face bat (*Pteralopex taki*) (Above left) captured in 2011 near Zaira. Radiotracking *Pteralopex taki* (Above) on New Georgia in 1992. Measuring a tree at a site (left) with *Pteralopex taki* on New Georgia, 1992.

CEPF contributions to knowledge of the status of other flying foxes in the Solomon Islands

- The dwarf flying fox, *Pteropus woodfordi*, was thought to be threatened (Vulnerable status) until 2017. This status has now been updated to Least Concern (not threatened) on the IUCN Red List, based on our information and surveys.
- Other CEPF-funded projects have contributed to Tyrone Lavery and colleagues' rediscovery of the Guadalcanal monkey-faced bat, *Pteralopex atrata* in 2015; it is still listed as Endangered (no recent status change).
- CEPF-funded projects by the Oceanswatch team have found two threatened species of flying foxes in Temotu Province alive in 2015; Critically Endangered Vanikoro flying fox, *Pteropus tuberculatus*, found on the main island of Vanikoro and neighbouring islands of Teanu and Utupia and previously thought to be extinct, the last known records were from the 1930s and in the 1960s the islands were heavily logged. The Endangered Temotu flying fox, *Pteropus nitendiensis*, found on Nendo, Malo and Tinakula was also recorded.
- The montane Monkey-faced bat, *Pteralopex pulchra*, from the Guadalcanal highlands is still missing, presumed extinct, and listed as Critically Endangered (flagged as Possibly Extinct). It is only known from one specimen.
- The status of the endemic species of *Pteropus* flying fox on Rennell Island (*Pteropus rennelli*) has worsened. It has changed from Vulnerable to Endangered, as it is likely to be declining due to increased logging and mining, and a lack of community protected areas where it lives.
- The status of the endemic species of *Pteropus* flying fox on Makira

(*Pteropus cognatus*) has improved from Endangered to Vulnerable based on improved knowledge collected by a CEPF-funded project with Tyrone Lavery and John Fasi, a PhD graduate from Makira.

Overall, the situation for Solomon Island flying foxes is more positive than we feared before the CEPF investment in the East Melanesian Islands hotspot, which has been amazingly successful in allowing us to clarify the status of nearly all species. Twice as many species have had recent status improvements. This is very good news, but it does not ensure the survival of Solomon Islands' flying foxes in the face of increased rounds of further logging and mining of regrowth and primary forests. The most sensitive species have declined, and we would expect that other species would not tolerate increasingly severe habitat loss even though they can survive some logging.

Diana Fisher is Associate Professor in the School of Biological Sciences at the University of Queensland, Australia.

Feasibility Studies for Conserving Santa Cruz Ground-Dove

WORDS AND PHOTOGRAPHS BY Ray Pierce

Climbing on to the spectacular volcanic island of Tinakula was a great privilege and fitting conclusion to our surveys of threatened birds and flying foxes of Temotu Province, Solomon Islands

Over the previous few weeks our team had successfully surveyed the Endangered Santa Cruz Shrikebill (*Clytorhynchus sanctaerucis*) and two species of Endangered flying-foxes (*Pteropus nitendiensis* and *P. vanikorensis*) on the larger islands of the province.

However, our current focus, the Santa Cruz Ground-dove (*Gallinolumba sanctaerucis*, or 'Vakavakatia' in the local language), had proven to be more elusive. Many reports of "ground-doves" on the larger islands turned out to be the similar-sized Pacific Emerald Dove (*Chalcophaps longirostris*), a widespread and common species. Meanwhile the reports of "rats" (*Rattus* spp.) being present on the seasonally inhabited Tinakula island did not provide much encouragement for finding the Vakavakatia there either, as ground-dove species are generally very susceptible to predation by rats and cats.

As we clambered up to the nearby campsite, however, my attention was suddenly diverted by two sets of bird calls emanating from the regenerating broadleaf forest – these were firstly from the small green Vulnerable Palm Lorikeet or 'Vlumba' (*Charmosyna palmarum*), and secondly from Spotless Crakes (*Porzana tabuensis*), both of which were present and common. These species are sensitive to feral cats and rats on oceanic islands, making them good "indicator species", immediately suggesting that the

island may in fact be free of these invasive species. Over the following nights we used traps, lures and spotlighting to confirm that there was no sign of rats or cats on the island.

The following day brought with it the ultimate encounter! We glimpsed Santa Cruz Ground-doves feeding on fallen seeds on an old lava flow that descended from the volcano's crater. Over a week we saw several pairs of them as we completed a series of walking transects through the forest and along the lava flows. These birds were very wary and it was not until our return visit in 2016 that we managed to secure good photographs and obtain reasonable data on abundance and age structure. We used different methods to estimate age structure spanning transects, motion cameras, hide photography and examining a captive sample (Table 1).

The captive sample was being held in a small aviary by a local trapper who was catching the birds apparently for a foreign market. This activity explained why the birds were wary of us because unmolested ground-doves are normally very tame and confiding birds. The trapper agreed to release the 10 birds that he held during our visit, but the following year we found that he had collected even more birds from the island, with around 70 of them being taken from the same (small) area of this study site in October 2017. These captive birds have since been intercepted and are now currently the focus of a rescue effort by BirdLife International working in

conjunction with OceansWatch and Solomon Islands agencies. The importance of these captive birds appears to have increased, as days later in October 2017 the volcano erupted covering much of the island in thick ash. At this stage we are uncertain of the status of the habitat and wild population of Vakavakatia on Tinakula, but early reports suggest that there are survivors and the habitat is expected to recover over time.

Despite these events, poaching is not the greatest threat to Vakavakatia - least not directly. The biggest threats for the species, as with other ground-doves, are the impacts of invasive species and unfortunately Tinakula is not entirely free of these. In recent years the island has been invaded by Yellow Crazy Ant (*Anaplolepis gracilipes*) and Little Fire Ant (*Wasmannia auropunctata*), both in the top 100 of the world's worst invasive species, while the gullies and erosion scars are being invaded by the invasive weed *Mikania micrantha*. Little Fire Ant is a very new arrival on Tinakula, but by 2016 we detected it, usually abundantly, on all 40 ant stations in our study area, each baited with the standard ant lures of peanut butter and jam on opposite corners of 100 mm x 100 mm waterproof cards. Little Fire Ant is beginning to impact the Tinakula fauna, noticeably on other species of ant, including Yellow Crazy ants which are disappearing. They could also already be impacting ground-doves as well, e.g. at nesting stage. Data on age structure collected in 2016 indicated that some

The biggest threats for the species, as with other ground-doves, are the impacts of invasive species and unfortunately Tinakula is not entirely free of these.



Tinakula Island (left). Lava flows (above) from previous eruptions on Tinakula descent to the sea. A male Santa Cruz Ground-dove (insert left) on a Tinakula lava flow. A female Santa Cruz Ground-dove (insert centre) on Tinakula. Endangered flying-fox *Pteropus vanikorensis* (insert right).

recruitment of ground-doves was occurring, and is further studied in 2018.

Future research needs include:

- Research on the impacts of Little Fire Ant and Yellow Crazy Ant on the Santa Cruz ground dove and whether the birds are sufficiently productive to maintain a viable population. Ideally this study would be extended to monitoring representative Solomon Islands birds generally, in the presence and absence of Little Fire Ant. This in turn could lead to future work on managing invasive ants, as studies elsewhere show the negative impact of them on bird fledglings.
- Studies to examine the feasibility of preparing other islands as potential

Captive birds have since been intercepted and are now the focus of a rescue effort by BirdLife International working in conjunction with OceansWatch and Solomon Islands agencies. The importance of these captive birds appears to have increased, as days later in October 2017 the volcano erupted covering much of the island in thick ash.

refugia for translocated Santa Cruz ground dove, for example in the neighbouring Reef Islands. This requires evaluations of habitat, invasive species (particularly rats and invasive ants), domestic animals (particularly cats, dogs, poultry etc), and the attitudes of communities towards invasive species eradication.

The above research can feed directly into Species Recovery/Action Plans, helping to develop reserve status and management plans for Tinakula and other sites, and supporting

domestic biosecurity.

Meanwhile, threatened species on the Temotu mainland are being put at risk from logging of primary forest. Efforts by communities and OceansWatch are aiming to secure these forests for protection. It is hoped that in 2018 and 2019 there can be habitats secured to protect these important endemic species.

Acknowledgments

The projects were funded by Critical Ecosystem Partnership Fund (CEPF), EcoOceania and OceansWatch and supported by communities, individuals, and agencies, including staff of Solomon Islands Departments of Environment and Conservation Division, Fisheries Division and Biosecurity Division.

Ray Pierce, Conservation Scientist. Current collaborative projects are in the Solomon Islands (threatened fauna of Santa Cruz Islands with CEPF and OceansWatch), Kiribati (biosecurity, invasive species management and bird monitoring with Pacific Biosecurity, Derek Brown and others).

Table 1. Estimated age structure of Vakavakatia from different sampling methods.

Method	Adult male	Adult female	Subadult male	Subadult female	Total (and %) subadults	Total birds
Transect	22	21	0	6	6 (12)	49
Motion camera	8	5	0	2	2 (13)	15
Hide photography	5	3	1	1	2 (20)	10
Captive sample	3	3	1	3	4 (40)	10

Network Building

Building a network to meet local and national development aspirations in Western Province

WORDS AND PHOTOGRAPHS BY
Gregory Bennett

With backing from the Western Province Government and CEPF, key stakeholders who support the idea of working in partnership for natural resource management and sustainable development in Western Province came together in Gizo on 12th April 2017 to officially form, “The Western Province Network for Sustainable Environment (WPNFSE).”



In Solomon Islands, the Western Province hosts the highest density of partners and projects working on the ground in conservation, natural resource management, climate change adaptation and development. However, presently, the efforts of conservation and sustainable development partners are adhoc, uncoordinated and often poorly reported. Given the isolated nature of the province, many environmental organizations see the value of creating, leading and being a part of networks.

Importance of networks and working together

Networks form when groups of individuals or agencies decide to work together in the belief that together they can achieve more than if they were to work on their own. It is common in dealing with specific environmental and development challenges that people from different government, NGOs and community groups come together in formal or informal networks.

Research has shown that networks are an important mechanism to a) draw together multiple skill sets, b) to promote environmental and development successes and c) to increase representation and accountability across different scales of decision making (i.e., from national governments to local communities). At both the individual and collective level, networking is a strategy of empowerment.

Impact of partner relationships

In previous meetings and workshops held in

the province, which were organized by the provincial government and other NGOs, participants echoed the importance of working together in partnership with the desire to build an effective and collaborative network to address the Provinces’ environmental and development goals.

WorldFish managed to grab the opportunity to facilitate the process through a project funded by the Critical Ecosystem Partnership Fund (CEPF), called “Building coalitions to enhance resource management and sustainable development in Western Province” in July 2016.

In the first inception meeting that was held in August 2016 to solidify the Western Province Coalition, participants at the meeting identified learning from other networks in Solomon Islands as an important part of building a strong network in Western Province.

In response to this identified need, WorldFish, with the support from the Western Provincial Government (WPG) organized a two-day workshop in November 2016 that brought together stakeholders from the various organizations’ that support the idea of working in partnership for the implementation of natural resource management and sustainable development in Western Province. The overall objective of the workshop was to share, reflect and learn from past experiences of working through networks in Solomon Islands, in order to co-develop a set of best practices to support networks throughout the country. It provided a great opportunity to draw on

A number of successful stories have arisen since the formation of the WPNFSE. One classic impact of the establishment of the network is the sharing of expertise and resources.

the rich experiences of existing networks and discuss ways in which all partners can learn to work more effectively together into the future.

The output from that workshop was a lessons learnt publication, “Five Principles for network success in Solomon Islands”.

Support from the Government

With backing from the Western Province Government and CEPF, key stakeholders who support the idea of working in partnership for natural resource management and sustainable development in Western Province came together in Gizo on 12th April 2017 to officially form, “The Western Province Network for Sustainable Environment (WPNFSE).” The lesson learnt document helped guided the stakeholders to develop the Terms of Reference (TOR) for WPNFSE.

In their deliberation the WPG executive acknowledged the formation of the WPNFSE and endorsed it to be housed within the Provincial Department of Environment. They emphasized the need for the network to promote environmental sensitive development in the province.

Evidence of sharing expertise and resources

A number of successful stories have arisen since the formation of the WPNFSE. One classic impact of the establishment of the network is the sharing of expertise and resources. Partners are more willing to share the limited resources they have when they are requested by other collaborating stakeholders. For example, Youth at Work, Pacific Community (SPC) funded organization based in Gizo, organized an event in May to raise awareness for youths in and around Gizo on the issues of solid waste management. The different partners of the network were asked to set up stalls at a designated venue to raise public awareness and share information to the general public, visiting school students and visitors.



Inception meeting (above). Group of women come together to discuss the effect of Climate change (left).

According to Hika Gone, the Deputy Coordinator of youth@work Program, “We have to reach out to our WPNFSE partners to address this issue collectively as we don’t have enough resources to target our youths and the public on the topic. It was amazing to see the positive response from 13 partners who volunteered their time for the 3 day event giving their expertise and sharing resources to the youths that showed up”. Furthermore, a call by the WPG to ban the usage of plastic bags in Western Province in June was fully supported by all the network partners. They came together and helped the Government with information. As the Western Provincial Planning officer explained, “We communicate much better now as a group than before as I notice the network solves collective challenges faster and more effectively”.

The WPNFSE is grounded with the concept that stakeholders who pool their resources have a greater ability to make connections to support changes needed for the Province.

Building on partner strengths and capacities

In Solomon Islands, many organizations see the value of networking and, in some cases, networks have facilitated positive outcomes. Nevertheless, ‘good networking’ can be difficult, often comes at a cost and requires that lessons learned are shared to promote repeat of successes and avoid recurrence of challenges.

For the WPNFSE, the provincial government has already paid their attention to the practicality of the network. A plan to ensure that the network has funds to sustain its existing functions and provide expertise and resources has already been deliberated. This will be channeled through the Provincial Environmental Department. As the WPG deputy premier echoed, “Gone are the days where we tried to undertake things individually through our respective organizations or departments. We have learned from our past experiences in workshops and meetings that the challenges are complex and it will need more than a team effort to tackle and address our daily environmental issues here in Western Province.”

The network realized that challenges and solutions in Western Province are more complex than any one organization can deliver. Therefore with the guidance from the lessons learnt document, the WPNFSE has come up with clear shared objectives, in which they agree to promote regular communication, share expertise and resources, and foster strong leadership. The network is already thinking long-term, so that conservation and natural resource management concerns are well supported and recognized in Western Province.

Gregory Bennett is former Western Province Hub Manager of World Fish Centre. He is currently Technical Programs Senior Manager of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security in North Sulawesi, Indonesia.



Some of the Members of the Western Province Network for Sustainable Environment.



The Network coalition with their community counterparts in their last meeting on the 1st November 2017.

Local rangers undergo legal training

WORDS AND PHOTOGRAPHS BY
Henry Kaniki

Arnavon Community Marine Park



Prior to the declaration of Arnavon Community Marine Park (ACMP) on 18th – 19th April 2017 and 18th – 20th July 2017, the local organization, Arnavon Community Marine Conservation Area, received funds from IUCN, as the implementors of the Critical Ecosystem Partnership Fund's (CEPF) Small Grant scheme.

CEPF is a global leader in enabling civil society to participate in and influence the conservation of some of the world's most critical ecosystems. CEPF is a joint initiative of l'Agence Francaise de De'veloppement (AFD), Conservation International, the European Union, the Global Environment Facility (GEF, the Government of Japan, the John D. and Catherine T. MacArthur Foundation and the World Bank.

The project aimed to provide local Arnavon rangers with legal knowledge and awareness prior to the registration of the Arnavon conservation area under the Protected Areas Act 2010 (an Act which is administered by the Solomon Islands Ministry for Environment, Climate Change and Disaster Management).

The ACMCA recognized the need to address conservation challenges by enforcing the national law at the community level. Rangers on the ground are the people with the responsibility and capability to lead any enforcement efforts, and make a difference to protecting areas and species of importance, and instilling confidence and bravery is a key component in successfully carrying out activities related to the Protected Area Act. The idea behind this project of translating national laws to the community level was the first of its kind in Solomon Islands.

As part of the training, provided by Mr. David Lidimani of Rano and Company, 11 Arnavon rangers and 3 police officers learned about legal powers and jurisdiction, offences and penalties, offences subject to infringement notices, and prosecution of offenders in court. The training included courtroom mock trials on prosecution of offenders. The knowledge base of rangers for appointment as inspectors under the PA Act was increased, ensuring that they are adequately qualified to assume prosecution roles in court. Said Joseph Matakai, "It is high time for the Arnavon rangers to utilize the law and to exercise our powers under the Act to effectively protect the unique environment in this region".

It was a historical milestone for conservation in Solomon Islands as Compliance, Monitoring and Enforcement are some of the obstacles that local rangers face when carrying out conservation at

Arnavon Rangers taking their time to read the scenarios outside of class (top left). Arnavon Rangers with their certificates (left & centre). Group photo after the training (left).

Solomon Islands hawksbill sea turtle (top right) (Photo Bridget Besaw).

The main issue faced over the past years in Arnavons Islands is illegal harvesting of turtles and other valuable species within the protected area. In many cases, rangers caught local fisherman and even reported cases to the local police, but no legal action was taken.



© Bridget Besaw

the community level. "It is the beginning of a new direction on how this conservation area will be managed and enforced in regards to the Protected Area Act and its regulations, said Dickson Motui, a senior ranger from Arnavons.

One senior ranger, Francis Routanis, stated "I am now confident in carrying out my legal duties within the protected area. In the past, poachers have had little respect for rangers but now this can change and should anyone breach any section of the Act the law now has teeth to bite".

At the end of the training, a formal ceremony was made to certify the Rangers, who were then appointed by the Minister of Environment as Inspectors and Prosecutors under the Protected Areas Act 2010.

Arnavon Community Marine Park is the first conservation area in the country to be declared under a national law, the Protected Area Act 2010, and to be legally recognized under the Act. Lessons learned from the Arnavons, from the establishment of the site boundaries, to community consultations to gain support for the Area, to the training needs of rangers, can be used by other communities at other sites, which may want to designate conservation areas in the future.

The rangers will put into action the knowledge they have gained by carrying out their duties within the Protected Area.

The main issue faced over the past years in Arnavons Islands is illegal harvesting of turtles and other valuable species within the protected area. In many cases, rangers caught local fisherman and even reported cases to the local police, but no legal action was taken. This in the past has been demoralizing for the Rangers, who are dedicating their lives to the protection of these unique landscapes and species, with little given back to them in terms of support or positive gains for the environment. Now, with the long-awaited declaration of the ACMP under the Protected Areas Act Regulations

2012, and the associated legal training, Arnavon Rangers are more confident and optimistic to be able to exercise their legal powers in protection of the Conservation Area, targeting illegal poachers for example. Specifically, Section 66 (1) states that legal powers allow authorized officers:

- (a) to stop, board, enter or search (as the case may be) any person, vehicle or vessel which the ranger suspects of transporting, removing or in possession of, whether within or outside a protected area, any specimen, species, plant, artefact, object or similar material;
- (b) seize any specimen, species, plant, artefact, object or similar material which the ranger has reasonable ground to believe has been removed from a protected area in contravention of the Act and these Regulations;
- (c) require any person committing a minor breach, whether of the Act, regulations or condition of a permit, to rectify or remedy such breach within a reasonable time;
- (d) order a person to stop or cease a specific activity if such activity is carried out in contravention of the Act and these Regulations;

The ACMP rangers, staff and board of management acknowledges IUCN and CEPF for supporting us with this project. This is just the beginning, and the training and support provided should be replicated in order to maintain the standard and competency of rangers as they continue with their vital task of conserving one special part of Solomon Islands for the future.

Going forward, ACMP would like to see more collaboration with our primary partners such as the Solomon Islands Rangers Association (SIRA), the Solomon Islands Environmental Law Association (SIELA) and line Ministries for the betterment of our nation.

Henry Kaniki is manager of the marine protected area and promotes the protection and recovery of stocks. He is a staff of The Nature Conservancy, his other roles include coordinating the activities of the Solomon Islands Ranger Association.

Propagation techniques for

Tubi

Implications for its conservation and rehabilitation

WORDS AND PHOTOGRAPHS BY Shane Tutua

Xanthostemon melanoxylon, is a rare plant species endemic to Choiseul and Isabel in Solomon Islands, where it is known locally as rie and tubi, respectively. It belongs to the family Myrtaceae, and can grow up to 35 m tall and 80cm diameter at breast height and produces very attractive flowers. The species is mostly found in low diversity lowland forests on ultramafic derived soils, which are deep free draining, highly acidic and leached soils with high nickel concentrations. The plant is also called ebony, iron plant or iron wood due to the extremely hard black heartwood the plant produced over time.

Tubi is considered a rare species and is restricted or banned for commercial exploitation in Solomon Islands. Recently, it became a threatened or endangered species due to the increasing interest in mining nickel in the ultramafic soils on Choiseul and Isabel islands, where the species is endemic. As a result, there is a need to develop a strategy to conserve tubi or rehabilitate the mined out landscape with tubi and to maintain its population.

This work explored a number of propagation techniques to produce seedlings for conservation and/or rehabilitation purposes should mining takes place in the natural habitat of tubi. In particular, trials were carried out on propagating tubi using wildings from the forest floor, seeds and vegetative propagation methods such as cuttings and buds.

This study found that sourcing tubi seeds from mature tall trees through litter traps was not very successful. In addition, sourcing seeds from a field planting trial established by this study showed that while tubi can produce seeds after 1.5 – 2 years following establishment, seed germination rate was less than 10%. However, collecting wildings from the forest floor and raising them as seedlings for field planting appears to be the most viable method of propagating tubi for rehabilitation purposes. Vegetative propagation from cuttings and buds has also proven to be successful methods of raising tubi seedlings. Field plantings of seedlings have been successfully established, with faster early growth rates achieved through application of amendments in the very acidic soils. This is of tubi's natural habitat.

This study demonstrated that apart from reserving specific areas for the conservation of tubi, conservation or rehabilitation of the species can be achieved through propagating the plant.

In the Solomon Islands, tubi is a banned or restricted species for commercial exploitation due to its rarity and slow stem growth. Recently, it is becoming a threatened species due to increasing interest in mining nickel in its habitat on Isabel and Choiseul. It is also threatened by loggers who have managed to export some containers of the species, and are keen to further exploit it as a

timber species. Thus there is a need to develop a management plan to conserve the species or rehabilitate its population from the impacts of mining and/or logging. A conservation strategy has been put in place and tubi was guaranteed protection under the Forest Resources and Timber Utilisation Act. This involves establishing natural regeneration areas, and prohibition of felling within conservation areas.

Sumitomo Metal Mining Solomons Limited (SMMS) is a nickel mining company that has an interest to mine nickel on Isabel and Choiseul. Its proposed mining activities are a threat to the ultramafic forest ecosystem, which is the habitat of Tubi. Thus under its obligation towards the Solomon Islands Government Environment Act 1998 and Environment Regulation 2008, SMMS intended to carry out progressive rehabilitation of mined out sites once operational.

Therefore, as part of a wider mine rehabilitation study to assess appropriate methods of ensuring rapid vegetation cover to restore ecosystem functions, SMMS explored different methods of raising Tubi (and other species) seedlings or planting materials, trying to understand the factors critical for early growth and establishment. This study was necessary as there was limited knowledge about the propagation of tubi and other species in these forest ecosystems.

The study was carried out at Leleghia 6 (8023'34.87 S, 159042'54.31 E) in the interior of eastern Isabel overlooking Huali bay towards the east and San Jorge towards the south. The site is within the SMMS nickel tenement, and therefore the soils and plant species around the site are typical of the ultrabasic forests where nickel deposits exist on Isabel. A nursery was set up at this site and all trials relating to the propagation of tubi were carried out at this nursery.

The trial consisted of four seedling production or propagation methods as follows:

1. Wilding Propagation

This involved collecting young wildings (seedlings) of Tubi on the forest floor and bringing these back to the nursery where the wildings were potted in polybags or planting trays until a certain

Tubi dominated forest, East Choiseul
(Photo. P. Pikacha).



height for field planting.

2. Seed Propagation

This method involved the collection of seeds from mature or taller tubi trees using litter traps to collect the falling seeds. Our attempt to collect seeds through litter traps was unsuccessful as very little or no seeds were trapped by litter traps.

Therefore, attention was focused on the 1.5 to 2.0 years old Tubi grown in the field from our Wilding propagation trial. A number of methods and growing media such as river sand and top soils from the trial site and from a farm on Guadalcanal were used to germinate the Tubi seeds. Grated coconut husks were also mixed into the soil media to germinate the seeds.

3. Branch Tip Vegetative propagation

This method involved selecting healthy branches of young tubi plants and cutting out plantlets about 10 cm from the shoot tip and just below the node. The cut end of the shoots or plantlets were then dipped into a rooting hormone powder then inserted into a sterilized growth media inside an improvised growth chamber. The growth chamber was made from a plastic container with apertures on the sides for air flow and underneath the container for drainage.

4. Bud Propagation (vegetative propagation)

This method involved plucking out buds growing from young tubi trees 1.5 – 2 years old that commonly come out of the stems. The broken off buds were then immediately planted into a soil/coconut husk media inside a growth chamber and covered to maintain humidity.

Seedlings or plantlets were regularly watered to avoid water stress. Tubi wildings collected from the forest floor and raised in the nursery showed very good survival rates. A darker shade and good soil mix and regular watering greatly improved survival rates. Survival rates were further improved when sourcing wildings of less than 10 cm from the forest floor. Wildings also reach field size (30 cm height) earlier and therefore are a quicker source of seedlings. Our initial wilding collections and transplanting to the field has been very successful and the trees planted have become our seed source in 1.5 – 2 years. Thus sourcing seedlings from wildings in the forest floor is a very successful method of raising seedlings for re-vegetation and repopulation purposes, and apparently a method that can be used for tubi conservation purposes.

Growing tubi from seeds seemed to be best propagation method as tubi seeds collected from the 1.5-2 year old trees are numerous and seeds can be easily carried around or stored. However, this study showed that tubi seed germination rates from the young trees were poor with germination rates achieved in the various soil media were always less than 10%. Nonetheless, survival rates from germinated seeds are high and therefore identifying ways to increase germination rates or seed viability is crucial to mass produce tubi seedlings to replace those destroyed by mining. One point that was not clear, however, is whether germination rates will increase with the age of the seed source (tubi stands where seeds were collected). This question needs to be further investigated by continuously monitoring seed germination from the current stands as sourcing seeds from older mature tubi trees in the forest was difficult.

This study showed that tubi plantlets in the growth chamber survived and grew in size over time. The survival rate was higher than other species such as *Dillenia*, *Camposperma brevipetiolata* (ketekete) and *Fagraea* spp (Bou). Uprooting of the tubi plantlets after three months showed that they were already establishing a rooting system within this period.

However, growth was slow and after 2 years most of the tubi

plantlets have yet to reach 20cm in height, 10cm fall short of the recommended field size of 30 cm height. Nonetheless, vegetative propagation would be useful during non-seeding or flowering seasons and can provide seedling shortfalls from seeds and other propagation methods. Again this study further demonstrated that vegetative propagation of tubi branches is possible as a means to propagate and conserve tubi as a species.

Buddings or bud propagation also showed similar results to vegetative branch propagation, but with higher survival rates even without the application of a rooting hormone. The stem and root growth rates were also higher than the branch tip vegetative propagation described above. These results showed that buddings or side shoots may be a preferred vegetative propagation method.

Tubi populations showed a good spread of age classes and resilience despite occasional bushfires which often kill all the tubi trees in affected areas.

The increasing interests in logging and nickel mining, however, could have a significant impact on the remaining tubi populations. Thus, apart from providing legal protection, setting up reserve areas and relying on natural regeneration this study showed that tubi can actually be actively propagated for conservation purposes.

Although the survival of tubi could be threatened by logging, mining and bush fires this study showed that it can be conserved

Tubi wildings collected from the forest floor and raised in the nursery showed very good survival rates. A darker shade and good soil mix and regular watering greatly improved survival rates.

through propagation and re-vegetation of disturbed sites using a number of propagation methods assessed in this study. This approach could support other conservation methods such as reserving forest patches within the tenements or logging concession areas.

Acknowledgments

This study was funded by Sumitomo Metal Mining Solomons Ltd, with technical assistance from Sumitomo Forestry Company Tsukuba Research Institute, Japan. In particular, the author would like to thank Mr. Kenji Matsune and Mr. Hiroataka Sato from Sumitomo Forestry Company for their contribution towards the trial design and trial establishments, Mr. Paul Ikoi and Mr Charles Paramana from SMMS for their assistance in the trial maintenance, and Mr. Derol Sikua, Mr. Keith Moveni and Mr. Ron Gholomo from SPE Consulting for trial establishment and monitoring.

Shane Tutua operates a soils laboratory in Honiara, Solomon Islands. He has conducted research on mining rehabilitation including experiments on the propagation of rare trees. His is also an avid organic farmer, and manages Zai na Tina organic farm, as well as consults widely.



Top The nursery at Leleghia 6 where the propagation trials were carried out.

Above centre Tubi buddings.

Above Wilding collection from the forest floor and wilding raised in the nursery until field size.

Right top Tubi wilding collection.

Right centre Branch vegetative propagation.

Right A young tubi plant with its attractive flowers.



PHANTOMS OF THE FOREST

Solomon Islands' giant rats are remarkable, and can be difficult to find

Who cares about rats?

To most people, the idea of entering remote forests to search for giant rats is madness. Why put efforts towards finding something that can easily be seen in the streets of Honiara?

Well, Solomon Islands rodents are no ordinary rats! The country is home to some of the world's largest, found nowhere else on earth. Isolated, and with no competition, the rats that colonised Solomon Islands evolved into spectacular tree-living giants, the largest weighing more than a kilogram.

WORDS BY [Tyrone Lavery](#), [Hikuna Judge](#), [Esau Kekeubata](#) and [Jeffrey Noro](#)

PHOTOGRAPHS BY [Tyrone Lavery](#) & [Patrick Pikacha](#)

This is an illustration of *Uromys vika*.
Image credit: Velizar Simeonovski, Field Museum.

Most islands in the Solomon Islands archipelago support one to three native rodent species, which are closely related to the rodents of New Guinea and Australia. Very little is known of their biology but it appears they only bear one or two young at a time, unusual for a rodent. Several spend their lives in the trees, but at least two appear to have been limited to the ground. Piles of mud gathered beneath the claws of one of Guadalcanal's giants collected between 1886 and 1888 suggest it was probably captured from a burrow. They are rarely encountered, all are threatened and some are probably already extinct.

Over the past few years we have surveyed various islands to gather information on known and potentially “undiscovered” species of rat. Because Solomon Islands species typically live in trees, they can be very difficult to find in the complex rainforests. However, with persistence we have collected important information on many of these species.

In September 2017, we revealed a new species of Solomon Islands rat to the world – one known locally as “vika”. When we published the scientific description of this new giant rat, found only on Vangunu, it was featured in over 1,000 news outlets around the world! This showed that people around the world do indeed care about Solomon Islands’ rats. It is because they are unique and unusual animals. They are part of the amazing wildlife found nowhere outside of Solomon Islands and we need to make sure we protect them for the future.

Vika of Vangunu

In 2010, on Vangunu Island, we learned of the giant rat known as ‘vika’. In 1995 anthropologist Edvard Hviding noted it in his dictionary of Marovo words – describing it as “a very big rat that eats coconuts”. People at Zaira village knew of it well. But no matter how hard we worked to spotlight, search hollow trees and set camera and rat traps we could barely find any sign of this mystery animal. The closest we came was a large rodent pellet collected from the forest floor that contained fragments of ngali nuts. Thankfully, our persistence finally paid off and we managed to capture a vika! It was caught in an area of forest that was being logged on southern Vangunu. It turns out vika is most closely related to three rats from Guadalcanal (two of which have not been seen since the 1880s). This new species will now be categorized as Critically Endangered on the IUCN Red List (the world authority on a species’ conservation status and extinction risk).

The Kainake Kamares

What has been documented of mammals on Bougainville (geographically part of the Solomons) is largely thanks to a Catholic missionary with a keen interest in natural history, Father JB Poncelet, and the Bougainvilleans he lived among at Buin. Poncelet sent loads of specimens to the Australian museum. The curator, Ellis Le Geyt Troughton, was particularly awestruck by one, a colossal rat weighing more than a kilogram, with long black hair and a thick prehensile tail. He named it *Unicomys* (now *Solomys ponceleti*). This species was later also found on Choiseul Island. It is listed as Critically Endangered on the IUCN Red List.

Almost 100 years later, we drove into Bougainville’s central highlands, through the crumpled steel frames, broken machinery and disused conveyor belts of Panguna, once the world’s largest open pit copper and gold mine, and on to Kainake in search of a giant rat known locally as ‘kamare’.



“They are rarely encountered, all are threatened and some are probably already extinct”

Was kamare Poncelet’s giant rat or a scientifically unknown species? After four days of hard slog setting rat traps and camera traps, spotlighting and searching hollow trees, we still had no idea. At an impromptu community meeting, it became clear we were doing some things wrong. First, with a big group of people, we were being very noisy. The number one rule of hunting is to be very quiet. And even worse, we talked constantly about how we were trying to catch a kamare. This is against local ‘kastom’. If you want to find something, you don’t talk about it.

With renewed commitment, one hunter immediately scaled a large ngali nut and reported signs of kamare. More hunters climbed the tree, and soon the entire village was running and shouting, sweeping towards the tree in celebration. In the first hunter’s hand was a giant rat – not Poncelet’s but a smaller, no less impressive species, the Bougainville giant rat (*Solomys salebrostus*), found only on Bougainville and Choiseul and listed by IUCN as Endangered. As far as we know, it was the first time the rodent had been documented on Bougainville since Poncelet’s work. It is an important find. We hope it will attract further support for the community’s initiatives to save a beautiful patch of Bougainville’s lowland rainforest.

Malaita’s monster rat

In 1927, linguist and anthropologist Walter Ivens wrote about a ‘monster rat’ on Malaita with teeth that could crack a ngali nut or husk a young coconut. The Kwaio call it ‘kwete’ and once used its lower incisors to carve shell necklaces. No scientist has seen this rat. By 1987, after searching forests and interviewing local hunters Tim Flannery feared it was extinct, wiped out by cats.

In 2014, a public health researcher on Malaita, David MacLaren, read about kwete in Flannery’s book and asked his colleague, Chief Esau Kekeubata, if he had heard about kwete as a small boy. ‘What do you mean heard about one when I was a small boy?’ Esau said. ‘I saw one with my own eyes a few years ago!’

We have now been on a mission to document this rat in a similar way as we did for vika, and the main way we are searching is by using camera traps. Camera traps are automatic, we can leave them in the bush for weeks at a time and if any animal walks past they will automatically take a photo of it for us – proof that this animal exists.

On Malaita, people from across the region have borrowed our camera traps to search for kwete. Last year we examined many of these photographs, but all they showed were pigs, cats, megapodes and introduced rats. One group had faced their camera toward the base of a ngali nut tree where they had placed ngali nuts to attract the kwete. We watched the footage of black rats repeatedly taking nuts from the pile. This group had also collected nuts chewed by rats, but the chew marks were nothing like those we have seen made by Solomon Islands’ giant rat species.

Then from the crowd emerged villager John Batee holding out nuts with chew marks exactly the same as those made by the kamare on Bougainville. We are now almost certain that the kwete still survives in Malaita’s vast forests. With persistence and some luck we could soon be lucky enough to sight this animal and solve one of the long-standing mysteries on Malaita!

Tyrone Lavery is a researcher at Kansas University, USA. Hikuna Judge is a ranger from Zaira, Vangunu Island, Solomon Islands. Esau Kekeubata is from the Kwainaa’isi Cultural group, Malaita Island. Jeffrey Noro is founder of The Kainake Project on Bougainville island.



Bougainville giant rat (*Solomys salebrostus*) known locally as Kamare (Above left) on Bougainville Island. On Choiseul Island it is known as kōmaka. Here it is found in its natural environment (Above and this page) at Sasamuŋa, Choiseul Island.



Choiseul Island

Protecting Mt Maetambe to Kolobangara River
Watershed

WORDS BY Peta Holcombe

In a crucial step to protecting tribal lands of Mt Maetambe and the Kolombangara River Catchment, Choiseul Province, Ecological Solutions Solomon Islands and tribal chiefs from the Kolombangara River catchment and representatives from Lauru Land Conference of Tribal Community, Choiseul Provincial Government and Natural Resources Development Foundation come together for the inception meeting. This meeting initiated the third phase of the Critical Ecosystems Partnership Fund and Bread for the World co-funded Ridge to Reef Project expected to run for two years from 2017 to 2019.

In Phase 3 of this Ridge to Reef Project will see the steps taken towards the development of protected areas under the Protected Areas Act 2010 for these important tribal lands. ESSI in partnership with Lauru Land Conference of Tribal Community (LLCTC), Choiseul Provincial Government (CPG), Solomon Islands Government (SIG) and the customary landowners will follow the steps outlined in the Protected Areas toolkit developed by the NSW Environmental Defenders Office to guide the preparation of applications for Protected Areas to the Director of Environment. Ecological Solutions Solomon Islands (ESSI), a local based organisation working out of Ghizo in the Western Province is committed to working with the customary landowners to protect their customary land. We want this to be a showcase of how customary landowners can gain long term benefits from their resources rather than selling them to logging companies for short term gain.”

Participants included chiefs and representatives from Kona, Voba, Matakale, Koloma, Jito, Garasa, Batono and Siporae tribes as well as representatives from other key stakeholders from Choiseul Province and LLCTC. Reverend Graham Mark, Chairperson of Lauru Land Conference of Tribal Community opened the meeting with a prayer and reflection identifying the importance of the protection of our natural resources



and sustainable management of resources critical for food and shelter. Reverend Graham Mark also spoke of the importance and power of the partnership built to undertake this project and that it will be seen as an example of how we can work together to protect our land.

The 12 steps for preparing an application for a protected area under the Protected Area Act was presented. Furthermore, information about the rights of the customary landowner and the potential benefits of protecting land including the exclusion of logging and mining as well as the development of a management plan to ensure long term sustainability of resource use. An important point is that the customary land owners have to be in agreeance

with every step of the process and land ownership does not change under this process but remains with the customary landowner. The next step in the process is to consult with customary landowners. ESSI went to each tribe and provide further information throughout December 2017, and January and February 2018.

The Ridge to Reef project was proposed in 2009 by Lauru Land Conference of Tribal Community in partnership with the Choiseul Provincial Government in response to the large-scale and widespread logging operations that were being undertaken in the Choiseul Province and the need to inform customary landowners of the potential impacts and support them



in protecting their natural resources and the important water source of the Kolombangara River Catchment. This project is now a part of the Choiseul Provincial Governments 3 year rolling Development Plan guiding strategic direction for the provincial government.

In 2014 Ecological Solutions Solomon Islands joined the project with funding from Critical Ecosystem Partnership Fund to undertake Phase 1; a survey of the Mt Mataembe/ Kolombangara River Catchment to develop a baseline biological inventory of the area. The result from this survey reiterating the importance of protection of this important biodiversity area and the watershed.

Phase 2 of the Ridge to Reef project

also funded by Critical Ecosystem Partnership Fund was initiated in 2015 and sees 9 tribal customary lands mapped by ESSI in conjunction with customary landowners. ESSI staff worked with local customary landowners to build their capacity to map their land using GPS, this was cross referenced with neighbouring customary landowners to ensure agreement on boundaries. Apart from some digital mapping undertaken by logging operations in the area this is the first-time mapping of this kind has been done and is important in not only enabling customary landowners to manage their resources effectively but also settle land disputes.

ESSI continues to engage with

The Ridge to Reef project was proposed in 2009 by Lauru Land Conference of Tribal Community in partnership with the Choiseul Provincial Government in response to the large-scale and widespread logging operations that were being undertaken in the Choiseul Province and the need to inform customary landowners of the potential impacts and support them in protecting their natural resources and the important water source of the Kolombangara River Catchment

Left and far left Forest and biodiversity surveys in the Kolombangara River and Forest watershed, Choiseul Island.

communities on Choiseul, and look forward to assisting in establishing a protected area soon.

ESSI would like to recognise the Critical Ecosystems Partnership Fund and Bread for the World for providing funding for this showcase project as well as acknowledge the commitment from Lauru Land Conference of Tribal Community, Choiseul Provincial Government, the Kona, Voba, Matakale, Koloma, Vito, Garasa, Batono and Siporae tribal landowners and the Solomon Islands Government to making this project a success.

By Peta Holcombe, Ecological Solutions - Solomon Islands staff through Australian Volunteer International.

A man wearing a wetsuit and goggles is kneeling in shallow water, laying out a transect line in a seagrass field. The water is clear, and the seagrass is visible on the bottom. The man is looking towards the camera.

Seagrass habitats and dugongs in the Lau Lagoon

WORDS BY Ronnie Posala, Ezekiel Leghunao, & Jan Van der Ploeg

PHOTOGRAPHS BY Jan Van der Ploeg

Laying transects in the seagrass, Lau Lagoon, North Malaita.



Village market (top), Lau Lagoon, Malaita Island. Lau Lagoon ranking exercise (centre and above), and participatory resource mapping where community members mark areas of significance in the lagoon.

Seagrass surveys (top right) in Lau Lagoon, Malaita. Seagrass (right centre) help stabilizing the sea bed, they providing food and habitat for other marine organisms, maintaining water quality, and supporting local economies. Dugong artwork by John Limaito'o (right).

Seagrass are marine plants that grow in the sea. Like flowering plants on land, seagrass have roots, stems, leaves and flowers, and need sunlight and clean water to grow. Seagrasses are found along seashores, in lagoons and mangrove areas and on shallow reefs. Seagrass are an important natural habitat, providing shelter, feeding grounds and a nursery for many marine species. A total of ten species of seagrass species are recorded in Solomon Islands. The largest seagrass meadow is found in Lau lagoon, Malaita province (approximately 1000 hectares).

The dugong is a large animal that lives in the sea. Dugongs are also sometimes called 'sea-cows', because of their seagrass diet. Dugongs can be found in shallow areas near the coast. They can live for more than 50 years. Females give birth in the water, usually to only one calf. The calf stays close to its mother for several years. The population status of dugongs in the country is unknown. In Lau Lagoon, the dugong reportedly used to be common, but nowadays it is rarely seen.

Seagrass – an important habitat for the Lau Lagoon

Lau lagoon is located in the northern part of Malaita province. People in the lagoon rely on marine resources for food and income.

Rabbitfish or 'Mu'u' is an important fish species for consumption and income. From the tales of local fishers, it is a highly productive fishery – one that depends on the seagrass habitat.

Seagrass is not only important for fishers, but also for farmers. Watermelons are an important agricultural commodity in North Malaita, and the watermelons from Lau are famous for being the sweetest in the country. Farmers collect seagrass on the beach and use it to improve the soil fertility of their gardens. This leads to bigger and sweeter melons.

The dugong, or 'ia tekwa' as it is locally known, is a culturally important animal for areas of the Lau Lagoon. Some tribes in Lau Lagoon consider dugongs to be sacred animals. People tell the story of a woman called Faifu, who was badly treated by her mother-in-law. One day, Faifu could no longer bear the insults. She asked her husband

Seagrass is not only important for fishers, but also for farmers. Watermelons are an important agricultural commodity in North Malaita, and the watermelons from Lau are famous for being the sweetest in the country. Farmers collect seagrass on the beach and use it to improve the soil fertility of their gardens. This leads to bigger and sweeter melons

and son to meet her after seven days at the seaside, and then jumped into the water. One week later, the father and the young boy waited for Faifu. At noon a dugong surfaced: from now on Faifu would live in the sea. Since then, many people in Lau Lagoon will not hunt or eat dugongs.

People tell stories of the past when large numbers of dugongs could be seen in the lagoon. They grazed on the shallow seagrass fields near the shore. With their constant movements and grazing, the dugongs made a deep channel through the seagrass. People used this 'dugong channel' to paddle to the mangroves. But when people killed the dugongs for their meat, the channel filled up with mud. Now, it is difficult for people to reach the mangroves during low tide.

People in Lau lagoon believes that fisheries in the lagoon are under increasing pressure. Overharvesting is threatening important commercial species such as sea cucumber, trochus and hump-head parrotfish. The use of trammel nets, or 'magnet nets', is impacting the rabbitfish and emperor fisheries. And the cutting of mangroves is



degrading nursery grounds and exposing the coast to storms. Several communities in Lau Lagoon have taken steps to use their marine resources more wisely. The village of Fumamoto'o, for example, declared a locally managed marine area in 2013.

Tools for community engagement in management of seagrass and dugongs

A participatory method of community engagement was employed to engage the involvement of community members in resource management processes in the Lagoon.

Different approaches included Participatory Resource Mapping where community members marked areas of significance in the Lagoon was used. This information together with the inclusion of local stories was developed into a map as an awareness tool for community members and schools in the area and elsewhere. The Seagrass Watch was utilised to determine seagrass distribution in the lagoon.

The Pebble Distribution Ranking method was also used as a way to determine the importance of the habitat for food, cash and culture in the Lagoon. It was clear from the activities that seagrass habitat plays a vital role for the livelihood of the Lau people, and dugongs as a culturally important species.

In addition to the lay folklore, other kastom stories about dugongs are being collected from elsewhere for development of a booklet.

This work is intended to feed into national awareness of seagrass and dugongs and to the development of a national strategy for dugong and seagrass management in Solomon Islands. This is part of the Global Project on "Enhancing the Conservation Effectiveness of Seagrass Ecosystems Supporting Globally Significant Populations of Dugongs across the Indian and Pacific Ocean Basins". The work in Solomon Islands is coordinated by the Ministry of Environment, Climate Change and Disaster Management (MECDM) and the Ministry of Fisheries and Marine Resources (MFMR) and implemented by the Solomon Islands Community Conservation Partnership (SICCP) and WorldFish as project partners.

Ronnie Posala and Jan Van der Ploeg work for the program of World Fish Centre in Solomon Islands. Ezekiel Leghunao works for the Ministry of Environment, Climate Change, & Disaster Management, Solomon Islands Government.



Herping the 'sunset' islands

A Glimpse of the frogs and reptiles on Ranongga and Vella Lavella Islands, Western Solomon Islands

WORDS BY Ikuo Tigulu

PHOTOGRAPHS BY Ikuo Tigulu & Patrick Pikacha



Emoia sp



Cornufer elegans



Cornufer bedigeri



Papurana krefftii (top), is common and adaptable with a presumed large population, and it is unlikely to be declining fast enough to qualify for listing in a more threatened category. Typical stream on Vella Lavella Island (above). Solomon Islands eyelash frog (*Cornufer guentheri*) (p49 right). Deforestation and habit loss is a threat to herpetofauna in Vella Lavella (p49 left).

It was half past noon. I looked up the steep slope and wondered what it would be like trekking under the scorching heat into the forest. With a team of ornithologists, mammalogists, herpetologists, local guides and porters, we walked up the trail through the village gardens, coconut and cocoa groves and into secondary forest (re-growth forest with thickets and vines) where we met an old logging trail that led towards the campsite. We were at Kara village on Ranongga Island, referred to by the natives as the sunset island. The 28 km long rugged and narrow island lies southwest of Gizo, the capital of Western Province. Little is known about the biodiversity of the island. The first night at the campsite was an experience. At dusk, different bird species flew over the camp humming their tunes in various parts and at night fall, the nocturnal creatures awoke from their sleep. Bats and insects replaced the regular village noises and frog calls were audible. Most frog calls sounded familiar but some were totally new to my ears, luring me to go herping immediately.

The vegetation is of secondary forest at approximately 300m elevation, which is getting up high in terms of logging, and the impacts are obvious. Re-growth vegetation is dominant in the locality and the forest canopy is not closed due to the area being logged some four to six years ago. Though not a thick forest, it nevertheless provides an important habitat for most of the frog species found here. There are only two frog species known and previously recorded for Ranongga Island, the Warty Webbed Frog (*Cornufer bufoniformis*) and Fauro Sticky-toed Frog (*Cornufer vertebralis*). For this reason, a feeling of excitement sparked within us to search exhaustively in the habitats of the surrounding valleys and ridges. There was a swamp forest a few metres away from the camp which is the habitat for the San Cristobal frog (*Papurana krefftii*) and Warty webbed frog (*Cornufer bufoniformis*). On the first night, we recorded and collected few individuals of the San Cristobal frog. Its advertising call interested me very much. The call is a series of 'chew chew chew' notes repeated every 2-4 seconds. This frog species (*P. krefftii*) is one of the new occurrences recorded for Ranongga Island. Other new records included the Solomon Wrinkled Ground Frog (*Cornufer solomonis*), Solomon Island Eyelash Frog (*Cornufer guentheri*), Solomon Islands Giant Tree Frog (*Cornufer hedigeri*), the Treasury Island Tree Frog (*Litoria thesaurensis*) and unfortunately the introduced cane toad, (*Bufo marinus*).

On day five of the expedition, we recorded the largest *C. bufoniformis* ever caught by my fellow colleague Piokera Holland. The frog measured at 143mm from snout to vent length (SVL), and was caught at around 10pm on the stream bank. Some nights we weren't that successful, with our frog spotting, and would only catch snakes and geckos. These reptiles were also of interest to our biodiversity surveys and were added to our numbers. Going up the trail, especially exceeding 300 metres, we often observed individuals of the Solomons wrinkled ground frog foraging on disturbed habitats on trail edges. On some occasions, I found it difficult to identify between species. This is a taxonomic challenge. For instance, some individuals from the Solomons wrinkled ground frog we found and collected, do have wide reddish stripes present where the back meets the side of the body, just like that of the Weber's wrinkled ground frog (*Cornufer weberi*). This would mean that wide reddish stripe is also a characteristic for the Solomons wrinkled ground frog and must be well keyed out so as not to be confused with the Weber's wrinkled ground frog.

One night, I was out by myself going downstream to see if I could hear calls from the Giant webbed frog (*Cornufer guppyi*). This frog species is found in most of the larger islands in the Solomon Islands



and prefers streams in lowland forest below 300m. Unfortunately the hunt was unsuccessful for *C. guppyi*, but was satisfying because I captured individuals from *Litoria thesaurensis* and *Cornufer guentheri*. A trail we once followed on a ridge was a perfect spot for the Solomon Islands Giant tree frog. When it rained a lot of individuals came down to a metre above the ground on low shrubs and *Alpinia* leaves. Since frogs are dependent on moisture, rainy nights or after hours of rain are the most suitable times for frogging. The team usually went out at night to do both recording and capturing of frogs. During the day, prepping of specimens took place, where we dissected frogs and took out body tissues such as the liver, skin and blood for DNA analysis. This was then used for sequencing and genetic studies. All these studies were done with permits approved by the Solomon Islands government and ethics permits from Kansas University.

Though logging has left the site since 2012, the damage made to the forest is obvious. Habitats here were somewhat fragmented and disturbed and that would be responsible for the low counts of some of the frog species we collected in the locality. Hence, the team urged the people in the community to manage their resources and protect the forests and the water sheds to maintain the health of the ecosystems that would be beneficial for their survival.

A Froggy Adventure into Sabaju, Vella La Vella Island

Located east of Ranongga is another island in the New Georgia group of islands known as Vella La Vella. As this island is bigger than Ranongga, we expected greater frog diversity. After the work at Ranongga, we crossed the strait and came to Pusiju, a village on the north east coast of Vella La Vella. Here, frog diversity is almost the same as the previous locality on Ranongga but we experienced an increase in the number of individuals observed. The locality name is Sabaju. The forest was different compared to the site at Ranongga. Lianas, epiphytes, vines and palms dominated the understory which provided a greater habitat variation for frog species that dwell here. The Sabaju campsite is of primary forest, with bigger trees that provide good forest cover and a closed canopy. The locality is a conservation area managed by the community.

Based on observations and collections, the dominant frog species in the area is the Solomon Islands Eye lash frog (*Cornufer guentheri*) and there is greater colour variation within the species as well. I wonder if colour variation within that species has something to do with their distinctive calls.

On our first night, I almost stumbled upon a Solomons Red krait (*Salomonelaps par*) while shining my headlight up a tree beside the stream looking for geckos. We caught the snake while it was trying to escape into a pile of leaf debris. At approximately 60 metres above sea level, we actually found and recorded six new occurrences of frog species for Vella La Vella. At last, we found the Giant Webbed frog (*Cornufer guppyi*) at a tributary that was connected to the main stream closer to where we camped. We were unsuccessful at Ranongga searching for that species. Here in Sabaju, the individuals were found on a single tributary on stream rocks, on the bank and river mud about one to two metres high. The Giant Webbed frog is one of the new occurrences for Vella La Vella along with Fauro Sticky-toed frog (*Cornufer vertebralis*), Solomons Wrinkled Ground frog (*Cornufer solomonis*), Solomon Islands Giant Tree frog (*Cornufer hedigeri*), Treasury Island Tree frog (*Litoria thesaurensis*) and again the Cane toad (*Bufo marinus*).

We captured larger individuals of the Warty Webbed frog (*Cornufer bufoniformis*) when we went looking for snakes at night. One night after the rain stopped, a guide and I hiked up the ridge line due north of the campsite to collect more frogs and in particular carry out some observations. We crossed a huge tree stump and found ourselves under a tree that has quite a number of the Solomons Giant Tree frog calling from the top of the leaves. A distinctive sound we heard that night, left us wondering if it was a bird or a frog. Several times we had to sit and wait in the dark to record the call, but it never called, as if sensing us.

Right at the top of the ridge is an ancient village, likely the remnants of early settlement by the original people who colonized the island, and whose descendants now live along the coast. Most of the bird's mist nets were set up along the trail on the ridge line. On one of my hikes up the trail, I witnessed a Stephan's emerald dove and a Vella La Vella White-eye being caught in one of the nets.

We experienced a difference in terms of species diversity, vegetation structure and types, and forest cover between the two sites we visited. It was clear that logging, though a legitimate business for economic development, is a huge threat to the environment and its ecosystems. Thus, communities must be better at managing their environment, including conserving and protecting the forests and the various species that inhabit these places.

Ikuo Tigulu is a biologist. He works for the program of Ecological Solutions in Solomon Islands, and coordinates many expeditions and field surveys in the country.



Freshwater Secrets

Filling gaps and improving knowledge of Freshwater Fauna in Solomon Islands and Vanuatu

Piokera Holland, field staff at Ecological Solutions - Solomon Islands writes about ongoing research partnerships in freshwater research, and some of the exciting finds around the Solomon Islands.

WORDS BY Piokera Holland

PHOTOGRAPHS BY Philippe Keith

Newly described fish species *Lentipes kolobangara*, endemic to Solomon Islands.

The Critical Ecosystem Partnership Fund (CEPF) provided funding to the Society of French Ichthyological (SFI), based at the Muséum national d'Histoire naturelle, (MNHN), Paris, France, and Ecological Solutions Solomon Islands (ESSI) to form a team to conduct research in Solomon Islands and Vanuatu.

The team then informed the Ministry of Fisheries and Natural Resources (MFMR) and the Department of Environment and Conservation (DEC) of the Solomon Islands Government (SIG) about the proposed studies. With the support of the SIG, the survey team then form a partnership with customary landowners, to survey freshwater fish and crustaceans in streams and rivers within their customary land.

This article focuses on the surveys that took place in the Solomon Islands from October 2014 to November 2015. Three sites were surveyed based on the CEPF priority sites: Mt Maetambe-Kolombangara River Watershed (Choiseul Island, Choiseul Province); Kolombangara Island Forest (Western Province) and Guadalcanal Watershed (Guadalcanal Province).

On Kolombangara Island, the team worked in partnership with Kolombangara Island Biodiversity and Conservation Association (KIBCA) and local customary landowners, Kolombangara Forestry Plantation Limited (KFPL), and Western Provincial Government.

A total of 52 species of freshwater fish, 27 prawns and 8 crabs were recorded. An exciting result is the record of four new fish species to science that were discovered. One of the new species was named after the local organization ESSI and called *Schismatogobius essi*. Another new fish species was named after the ESSI Co-Director, David Boseto, and called *Eleotris bosetoi* and the third new fish species was named after the river where it was found *Lentipes kolombangara*. The fourth new fish species was named after the war Lord of Kolombangara Island as *Schismatogobius tiola*.

The survey in the interior of Guadalcanal was made possible through the partnership fostered with the Uluna and Satahuri tribes and the Guadalcanal Provincial Government. A total of 11 fish species and three prawn species were discovered. The highlight of the work is the discovery of a new freshwater fish species



A typical oceanic stream.

that the team collected from Kolombangara River, on Choiseul Island in October of 2014. The fish species was later named as *Lentipes kolombangara*. Another exciting result is the extension of the distribution area of an endemic freshwater fish that was previously recorded from Makira, Rendova, Ranogga, Malaita and Choiseul Islands.

The team was also part of the Mt Maetambe-Kolombangara River Watershed expedition in Choiseul Island. The team collaborated with the Lauru Land Conference of Tribal Community (LLCTC), Customary land Owners and Choiseul Provincial Government.

The overall results from the 2-year survey is 63 species of freshwater fish, 28 prawn species and nine crab species. In which a total of four freshwater fish, three prawns and one crab are new to science. Most of the prawns and crabs recorded from the three islands surveyed are new records for Solomon Islands.

This project clearly focused on a few things. These include;

- Increasing knowledge of important biodiversity areas,
- Filling in gaps in knowledge with regard to target species at CEPF priority sites
- Understanding species of cultural and economic importance (e.g., gobies, eels and shrimps) to local people, and indicators of ecosystem health (gobies)
- Involving relevant government institutions and community members, and provide opportunities for capacity building in taxonomy
- Demonstrating that the survey results, and any subsequent conservation actions, will be published in an appropriate form so they are freely available to other groups wanting to work at the site in the future

A total of 52 species of freshwater fish, 27 prawns and 8 crabs were recorded. An exciting result is the record of four new fish species to science that were discovered.

- Demonstrate that the survey is a means to an end, in terms of developing a foundation of knowledge and relationships for future support to communities at the site.

This project also provides capacity development in taxonomy and ecology for local upcoming scientists, community rangers and guides. The team also conducted awareness programs by presenting the findings of the surveys with the communities.

Other benefits from this work will provide help to;

- Raise awareness and gain an understanding of the rich freshwater biodiversity present in rivers, and the role of pristine forest on habitats and freshwater quality.
- Provide important information concerning conservation and management actions where needed.
- Strengthened capacity of staff from Local NGOs, Community Based Organizations (CBO), government departments, and communities protected area initiatives in the Solomon Islands in taxonomy and ecology of freshwater fauna (fish and crustaceans).

We see our work as the support for the development of an inter-disciplinary tool for the restitution of knowledge about species and for management actions that could readily be implemented by local communities and managers. The information will however be of use to other stakeholders, especially those involved in education and public awareness programs.

Piokera Holland is a field assistant who works for the program of Ecological Solutions in Solomon Islands. He has accompanied many researchers and lead conservation initiatives in the Western Province.



Stiphodon rutilaureus, a rare freshwater goby found in clear fast-flowing streams.



Smilosicyopus fehlmanni, a fairly common species.



Lentipes solomonensis, endemic fish to Solomon Islands



New described *Schismatogobius tiola*, endemic fish to Solomon Islands

Freshwater hidden treasures

A team of freshwater specialists from four different countries (Solomon Islands, Australia, France and New Zealand) assembled to go on a treasure hunt search rivers and streams on Choiseul Island, Solomon Islands for rare and new species.

WORDS AND PHOTOGRAPHS BY [Philippe Keith](#)





Atyopsis spinipes (top), a wide ranging species, reported from the Philippines and Lesser Sunda Islands (Indonesia), northwards to Taiwan and the Ryukyus and eastwards to the Pacific, Solomon Islands to Samoa, including Fiji and Guam. *Caridina gracillirostris* (centre), is also widespread from Japan and eastward into the Pacific. Newly described fish species *Lentipes kolobangara* (above) endemic to Solomon Islands.

Our team of freshwater specialists from four different countries (Solomon Islands, Australia, France and New Zealand) was assembled to go on that treasure hunt. Knowledge in our team ranged from taxonomy (with a focus on fish and crustaceans), habitat assessment and management, and overall freshwater ecology. Based on previous preliminary surveys, Choiseul Island was expected to contain a high level of species richness. After an epic journey for some (who nearly missed their plane from Brisbane airport) the team quickly left Honiara on an early flight to Choiseul, where, after a good breakfast and some last minute shopping, the adventure could commence. A long trip by boat carried personnel and equipment safely to the first camp at Pikusu, up the Kolombangara River. One large crocodile was sighted sun-bathing on the way. Many were surprised by the heavy discoloration of the water and we quickly found out about some forestry operations occurring higher in the catchment. Pikusu felt like a 5 stars camp with its own kitchen quarter and cook! Experiencing our first night in the jungle to the sounds of frogs was really quite special. We were welcome and briefed by the local tribe members and lots of interesting discussions took place around dinner time.

Work started the following morning and we split the team in two, with some snorkeling and other fishing with an electro-fishing machine. This is a technique that consists in using a portable electricity generator that sends current between two electrodes: one lying behind the operator on the substrate and the other handed by the operator and moved quickly around in the water column around potential fish hides. When a fish comes within the thus created electric field, it is stunned (but not killed) and can then be easily caught with a hand net. Fish caught are placed temporarily in a bucket and then later identified and returned to the water. A few specimens are kept and fixed in ethanol for genetic work and further identification when needed.

Fish and crustacean species of Kolombangara are mainly diadromous. This is a scientific term used to simply express that they are migratory species that move between freshwater and saltwater during different parts of their cycles. Most of the species we caught are born in freshwater. Once the eggs laid by the adults on the substrate along the banks hatch, the young larvae are carried by the flow back out to sea where they spend a variable amount of time before returning to freshwater as young fry (which are on some islands caught as fry; those species are members of the Gobiidae family). They then resume their growth during the migration up the river and streams. Some go higher than others. One freshwater migratory fish has the opposite cycle: the eel. Two species of eels are found in Kolombangara catchment but both start their life deep at sea in places that no-one has yet been able to locate precisely. They spend their adult life in freshwater, several decades often. And when they are ready, they migrate back out to sea to that secret place where eels go spawning.

Our first surveys quickly confirmed the high species richness present in the tributaries of the Kolombangara, although each species was relatively low in abundance. Perhaps a reflection of the long distance from the sea fish have to swim to get to those side streams at the mercy of numerous predators as well as degrading water quality, as mentioned above. Our climb along the first stream, above waterfalls, confirmed that the altitudinal distribution was however conformed to what is commonly found for fish and crustaceans on all Pacific Islands. Three main zones can thus be characterized: the lower course, of low gradient and typically of reduced length, the middle course where the stream bed becomes covered with coarser

substrate (pebbles and cobbles) and the higher course which is usually steep with cascades and waterfalls alternating with deep pools where the water is well oxygenated, and larger cobbles and boulders. Food tends also to become rarer with altitude which explains why only some species (*Sicyopterus* species, *Macrobrachium lar*, *Anguilla marmorata*) are cosmopolitan throughout this altitudinal gradient. Similarly, only a few species live in the higher course (*Anguilla megastoma*, *Lentipes* species, *Macrobrachium latimanus*). Some others can climb waterfalls too but seem to be less interested to pursue a long journey up. Among those *Sicyopus* and *Smilosicyopus* species which, with *Lentipes* and *Sicyopterus*, belong to the Gobiidae family. Fish of that family have evolved with their pelvic joining in one to form like a sucker, which provides them with this great ability to climb up wetted rock faces.

These patterns remain consistent throughout the survey. All streams were within pristine forest catchments and we noted that all of them were fairly similar in terms of fish and crustacean biodiversity.

Nothing was known on crustaceans in the Solomon Islands before this survey. All the species caught were therefore new occurrences for this country and for Choiseul. One new species of crab (*Sendleria* nov.sp) was collected with many other rare species. For fish, we have recorded in total 10 new occurrences with a number of possibly undescribed and new species. Remarkably, no introduced species was found.

In total, 52 species of fish and 34 species of crustaceans were inventoried during our 10 days in the catchment.

Many of those species would warrant conservation measures. Key actions contributing to conservation are:

- To ensure artificial barriers (such as dams) do not prevent the free movement of species between the downstream and upstream reaches of the streams
- To ensure minimum flows are maintained in order to maintain enough current and resulting oxygenation in the water
- To maintain forest cover in all catchments and along riparian margins (it ensures the maintenance of cool temperatures that some species require, provides exogenous food (insects falling from the trees) and prevent sediments being washed down into the water
- To maintain the quality of water and margins of the estuarine zone where larvae and fries need to use as part of their life-cycles
- Further research in understanding better the life-cycle of the rare species is also warranted so that management and restoration strategies can be developed and implemented.

We thoroughly enjoyed our trip to Choiseul and we remember fondly the time spent with our local hosts at the 3 camps we stayed at. We also valued their support and help during the long walks between the camps. Camp 3 was very special. It was so nice to see the Kolombangara River as it should be right down to its mouth: a river with clear water running over clean rocks, cobbles and pebbles. It was so stunning and sad to spot which tributary was bringing a heavy sediment load: the one where a logging company has been allowed to clear those pristine forests to a point where natural filtration from the ground cover cannot be sustained, causing a huge modification of the water clarity and quality, causing an accumulation of silt on the river bed that contributes to destroy the habitat of these important aquatic communities and the water supplies of villagers downstream.

Philippe Keith is curator of fishes in the National Museum of Natural History of Paris, France, and world expert on freshwater fishes. He has published in more than 250 papers, 90 communications and/or posters in congress.



Understanding freshwater systems in Melanesia is important to helping organisations and natural resources users better manage these systems and resources.

An aerial photograph of a vast, lush green forested mountain range. The terrain is hilly and covered in dense vegetation. In the upper right portion of the image, a vibrant rainbow is visible, arching over the forest. The sky is filled with soft, white clouds, and the overall atmosphere is serene and natural. The text is overlaid on the left side of the image.

Choiseul Island

A biogeographic stepping-stone for reptiles
and amphibians of the Solomons Islands

WORDS BY [Jonathan Richmond](#), [Scott Travers](#), & [Adam Backlin](#)

PHOTOGRAPHS BY [Patrick Pikacha](#)



1



2



3



4



5

The Solomon Islands are known for their high biodiversity, ranking second to Papua New Guinea in terms of species richness and abundance in the western Pacific Region. Their linear orientation along the Pacific Plate Boundary provides a 1300 km natural series of 'stepping-stones' that have enabled plants and animals to disperse historically between the Solomon Islands rain forest ecoregion to the north (which includes the politically autonomous regions of Buka and Bougainville, Papua New Guinea) and the Vanuatu rain forest ecoregion to the south (which includes the Santa Cruz Islands and the neighboring archipelago of Vanuatu). Because of their spatial configuration and the tendency for biodiversity to decline with increased distance from larger landmasses, the northern Solomon Islands generally harbor more diversity than the southern Solomons due to their closer geographic proximity to the species-rich and larger islands of Papua New Guinea.

This stepping-stone configuration of islands has played an important role in how reptile and amphibian species first arrived in the Solomons, as well as the ways in which new species formed in these groups after the arrival of their ancestors. Because snakes, lizards, and frogs have evolved to live on land (although frogs of course also live in fresh water), they are generally bad at dispersing across the open ocean, particularly the salty, rough waters of the Solomon Sea. However, as the numerous islands of Papua New Guinea and the Solomon chain emerged out of the ocean and shifted their position over many millions of years, gaps between the islands grew smaller, leaving shorter travel distances for snakes, lizards and frogs. With shorter distances and more islands surfacing above the water, combined with extended periods of lower sea level during the last ice age, the chances of surviving on a floating log or other vegetation, or perhaps even swimming in some cases, and reaching a new island increased dramatically. If multiple individuals of the same species successfully made the trip, then the chances of establishing a home on a new island got even better.

1. *Emoia flavivularis*, 2. *Cornufer aculeodactylus*, 3. Poncelet's crocodile skink *Tribolonotus ponceleti*, 4. *Cornufer wolfi*, 5. A new species of *Cornufer*.

A key link in the stepping-stones that connect the very large islands of Papua New Guinea with those in the Solomon chain is Choiseul, the largest (land area of 3294 km²) and northernmost of the political Solomon Islands. Its location between Bougainville and other provinces of Papua New Guinea to the north and other large islands to the south suggests that the reptiles and amphibians on Choiseul may provide important clues about how and when these animals dispersed between Papua New Guinea and Solomons, or whether new species formed only after their ancestors became established in the Solomons. Because Choiseul has some of the largest and last remaining intact tracts of tropical rainforest in all of the Solomon Islands, researchers recognized that it was likely that many, if not most, of the reptile and amphibian species

The remoteness of Choiseul in a far corner of the world, the pristineness of its tropical rain forest, and the fact that so few biodiversity surveys have ever been conducted on the island, led researchers to other thoughts – how many other species known from other Solomon or New Guinea islands might be surviving on Choiseul, but have never been documented there?

that originally colonized the island could still be located or identified. Unfortunately the same cannot be said for other islands in the Solomon chain, where rain forest destruction may be outpacing the rate at which scientists can document the original biodiversity.

The remoteness of Choiseul in a far corner of the world, the pristineness of its tropical rain forest, and the fact that so few biodiversity surveys have ever been conducted on the island, led researchers to other thoughts – how many other species known from other Solomon or New Guinea islands might be surviving on Choiseul, but have never been documented there? Better yet, how many species on Choiseul might not even be known to science? Better still, does Choiseul have any unknown

species found nowhere else in the world? Recognizing the implications of these questions, yet understanding that there was a general lack of information to answer them, scientists with Ecological Solutions Solomon Islands (ESSI), members of the Lauru Land Conference of Tribal Communities (LLCTC), the Choiseul Provincial Government, the Secretariat of the Pacific Regional Environment Programme (SPREP), and local tribal leaders living along the Kolombangara to Mt Maetambe corridor developed a plan to conduct a rapid inventory of the island's fauna and flora in October of 2014. Their plan was further motivated by an even more important consideration for local communities - Choiseul's fragile rainforest is now under threat by large scale commercial logging operations, planned deforestation for access

to nickel deposits in 2016, ongoing gold prospecting, and a proposal to establish over 4,000 hectares in north Choiseul as a palm oil plantation. All of these activities will have significant environmental impacts, but without good baseline knowledge of the island's biodiversity in its current state, the extent of any future damage to Choiseul's environment, plants, animals and its indigenous people cannot be fully understood.

The Mt Maetambe-Kolombangara River Corridor Expedition

As assistants to the local scientists, villagers, and community leaders, the expedition included researchers from various government and academic institutions around the world. These researchers were selected based on their ongoing studies and expertise in particular taxonomic groups, such as birds, mammals, reptiles, amphibians, and freshwater fish and invertebrates. Our team was responsible for documenting the reptiles and amphibians and consisted of scientists with ESSI, Solomon Islands National University, and two institutions in the United States - the University of Kansas (Lawrence, Kansas) and the United States Geological Survey (San Diego, California). Although we were treated as the supposed experts by the locals upon our arrival, after a few days in the field it became rather obvious that the real experts were already living on the shores of the island, and that we had as much to learn from them as they did from us.

The expedition focused on two main locations, but due to travel distances and



Above: *Palmatorappia solomonis*, endemic to Bougainville, Choiseul, and Isabel and satellite islands. **Top right:** Solomon eyelash frog *Cornufer guentheri*. **Above right:** *Cornufer bufoniformis*.

stopovers at different places in between, we were also able to conduct some small-scale surveys in several coastal areas. The main sites were the mid-elevation Sarelata Hills, located near the middle of the island on the north facing side of the high peak Mt. Maetambe, and the low elevation Sirebe Rain Forest and Biodiversity Preserve on the lower Kolumbungara on the south side of the island. To get to Sarelata, we initially traveled by boat from Taro to the coastal village of Ghaghara, where we then met up with our local guides and porters before setting off on a grueling 18 km hike up to our camp in the Sarelata Hills. The hike included several river crossings, steep ascents followed by even steeper descents once we hit the ridgeline, and some impressive mud that at times felt like we were walking through ankle-high peanut butter. The south side of the island was an entirely different experience – after spending an evening under the care of local villagers in Sasamugga, we traveled by boat up the crocodile infested waters of the Kolobungara River to the Sirebe Preserve, where the ascent to camp was on the order 10 meters and the trek with all of our gear was only about 40 meters away from the shoreline.

Because animals adapt to the environments they live in, the survey locations at Sarelata and Sirebe provided ideal study locations due to differences in

Despite the remaining knowledge gaps, the fact that there is such extensive local community interest in preserving the island's biodiversity and natural resources ensures that these gaps will continue to get filled in and formally documented.

elevation and in the types of habitat they support – this increased our chances of capturing as many different lizard, snake and frog species on the island as possible over a relatively short amount of time in the field. Even within these main sites, different species tend to occupy different parts of the habitat to minimize competition for food or other resources, or to avoid encountering certain types of predators. Because of this ‘ecological partitioning’ among species, we were careful to search for animals on the ground, in the bushes and on logs, as well as high up in the trees.

Thanks to the help of local guides and their incredible physical endurance, we were able to collect 242 specimens that represent 42 known species – 17 species of frogs, five species of snakes, and 20 species of lizards. Included in that pool of 242 specimens were two possible species of frogs not yet known to science, and three species known to science but not yet formally documented on Choiseul. We collected tissue samples

for DNA studies from all specimens, photographed representatives of all species, documented ecological and natural history data when possible, and even harvested a variety of parasites living inside the body cavities of several lizards and snakes. Frogs were the most diverse of the three groups. Although heavy rains at Sarelata tended to slow our survey work at times, it had the opposite effect on frog activity, where calls from over a dozen species often drowned out the sound of the falling rain. The frogs were diverse in body form and ecology, ranging from the stream dwelling Giant Webbed Frog *Discodelaps guppyi* capable of growing to the size of a breadfruit, to the bright green Solomon Island Palm Frog *Palmatorappia solomonis* living high in the trees, to the tiny adults of a presumed new species of sticky-toed frog in the genus *Batrachylodes*. Amazingly, most of the adult *Batrachylodes* were no bigger than our thumbnails, and often times we could only find them by listening to their calls and zeroing in on

their location. We also found a number of individuals of the iconic Solomon eyelash frog *Cornufer guentheri* one of the most unusual and colorful frog species in the world. Found only in the Solomon Islands, the species has unfortunately grown popular in the commercial pet trade due to its large, triangular head and prominent ‘horns’ on both eyelids and the tip of the snout. We were fortunate enough to see individuals of all age classes at both Sarelata and the Sirebe Preserve.

For reptiles, we collected a number of different species of skink, a type of lizard found on many Pacific Islands. One of the most impressive skinks anywhere in the world is found only in the Solomon Islands – the Prehensile-Tailed Skink *Corucia zebrata*. This very large skink (350 mm body length, not including the tail) lives high in the trees and uses its muscly tail to grab on to the branches. Unlike most other reptiles, females of this species give birth to live young rather than laying eggs. We captured only one *Corucia*, but we continually found ourselves imagining how many we might be walking right underneath because they are so difficult to spot in the trees. Another interesting skink known from other islands surrounding Choiseul, but not yet formally documented on Choiseul, was Poncelet’s crocodile skink *Tribolonotus ponceleti*, an unusual lizard that looks remarkably similar

to a miniature crocodile. Known only from Bougainville, Shortland, and Isabel, our capture of this species in the coastal village of Ghaghara filled in a key ‘stepping-stone’ in the species distribution. We also found numerous species of small skinks in the genus *Emoia* and *Sphenomorphus*, as well as many different kinds of geckos, including the large Ring-Tailed Gecko *Cyrtodactylus solomonensis*. This species occurs only in the Solomon Islands, and like most geckos it is nocturnal and tends to be found high in the trees.

Last but not least...the snakes! Snake species diversity was much lower than for frogs and lizards, with only six species known from Choiseul. We managed to catch four of the six that had been previously documented, with one of the missing species being the Solomons Black-banded Krait *Loveridelpas elapoides* (a member of the cobra family). According to our field assistants from Sasamugga, the venomous Black Banded Krait has noticeably declined in recent years as numbers of the non-native, invasive Cane toad *Bufo marinus* have rapidly increased. Whether the Cane toad is causing the snake to disappear and why that might be the case requires further study – it could also be that the Black-banded Krait naturally occurs in low numbers and is simply difficult to find. We were able to catch individuals of a second cobra species, the Solomons Red Krait *Solomonelaps par*, which was relatively abundant at both camps and readily attempted to bite anyone that was willing to try and capture it. The most common snake was the Brown Treesnake *Boiga irregularis*, a species that moves swiftly in tree branches and is widespread in New Guinea and the Solomon Islands. Ancestors of this species almost certainly took advantage of ‘island stepping stones’ to extend its range throughout the Solomons, but however some of its present day range has also been aided by careless human activity (with catastrophic consequences on the Pacific Island of Guam). Other snake species collected on Choiseul included several of the so-called blind snakes in the Family Typhlopidae, which are small burrowing snakes that look more like earthworms than they do true snakes, and the Solomons Ground Boa *Candoia paulsoni*. The Ground Boa is locally referred to as the ‘sleeping snake’ given its reputation for lying motionless, camouflaged in the same position for many days until a prey item such as a bird or lizard comes within its reach.

The outlook on Choiseul's future biodiversity

While our surveys added important baseline knowledge about Choiseul’s reptile and amphibian fauna, it was clear that there is still much more to learn, and that other large, unexplored portions of the island may harbor even more species not yet known on Choiseul, the Solomon Islands, or even to science. This is particularly true of the high elevation ridgelines, where almost no biological exploration has ever been conducted. Despite the remaining knowledge gaps, the fact that there is such extensive local community interest in preserving the island’s biodiversity and natural resources ensures that these gaps will continue to get filled in and formally documented. It also suggests that the indigenous fauna and flora will remain intact long into the future, especially if younger generations are taught to see beyond the short-term financial motives involved with non-sustainable logging and mining activities. Choiseul has recently become a model for conservation efforts in the western Pacific Region due to recent, proactive responses to the effects of climate change, commercial logging, and mining operations. So far, these responses include the designation of protected lands that extend from the high elevation ridgelines to offshore coral reefs, as well as sponsoring expeditions like ours that are aimed at engaging local and international scientists and promoting awareness about the importance of preserving biodiversity. Such progressive thinking and community-level action is quite remarkable given that leaders of many larger and wealthier western countries fail to even acknowledge the reality of human-induced climate change and its already apparent effects. To quote the former U.S. president Lyndon B. Johnson: “Once our natural splendor is destroyed, it can never be recaptured. And once man can no longer walk with beauty or wonder at nature, his spirit will wither and his sustenance be wasted.” The caretakers of Choiseul seem more determined than ever to maintain her splendor.

Jonathan Richmond is a wildlife geneticist with the United States Geological Survey in San Diego California. His research mainly involves conservation genetics of threatened and endangered reptiles and amphibians in the southwestern United States, Baja California, and on Pacific islands. Scott Travers is a PhD student at the University of Kansas in Lawrence, Kansas. His interests lie in understanding the patterns and processes of speciation in amphibians and reptiles in the western Pacific Region. Adam Backlin is a wildlife biologist with the United States Geological Survey in San Diego California. He conducts field monitoring and research on threatened and endangered amphibians and reptiles in southern California, Baja California, and on Pacific islands.

CONSERVATION DEVELOPMENT



Shifting towards a more economically sustainable future

WORDS BY Alexandra Takeshita

The world is full of incredibly diverse and resources rich ecosystems. Since before the development of modern civilization, people have been living off the land to provide for themselves through local resources. These resources were used to build shelters, provide sustenance, and trade among villages. However, these ecosystems are at risk of exploitation due to rapidly growing population, developing economies, and consumer led globalization.

Worldwide, tropical rainforests are at risk due to over exploitive logging practices. As a result of limited regulation and enforcement, companies are not being held accountable for their damaging and sometimes illegal logging practices; leaving ecosystems severely degraded and unable to recover. Due to their unique island geography and limited governmental forest management practices, the tropical forests within the Solomon Islands are a target to both international and domestic logging companies. However, there are a few organizations leading the shift towards a more sustainable forest logging management schemes.

Kolombangara Island, located within the Western province of the Solomon Islands, is a unique example of how forestry industries are able to thrive alongside conservation efforts. Previously, Kolombangara was heavily degraded under the management of a British logging company. Failed restoration attempts by the Solomon Island government resulted in the request for the creation of economic income to help assist financially. Thus the creation of the Kolombangara Island Forest Products Limited (KFPL). The company was established in 1989, and has been able to integrate sustainable plantation farming and conservation efforts. As part of their 75 year lease agreement over 2/3 of the island, the company has agreed to limit their plantation efforts to below 400m and protect the upper 20,000 hectares.

In order to ensure adequate forest management, KFPL delegated authority to the Kolombangara Island Biodiversity and

Conservation Association (KIBCA), founded in 2010, to front education and outreach campaigns, management, and monitoring of the protected areas. As the only Forest Stewardship Council (FSC) certified company in the country, they are breaking ground for sustainable forest management.

When I learned about the relationship between KFPL and KIBCA, I was very intrigued with the collaborative effort they do to sustainably manage Kolombangara. Being a student from the University of California studying environmental policy and sustainability, I understand how unreasonable it was to conserve and protect all forests. The forest are filled with wonderful diverse wildlife but also contains resources that are essential for the functionality of some economies.

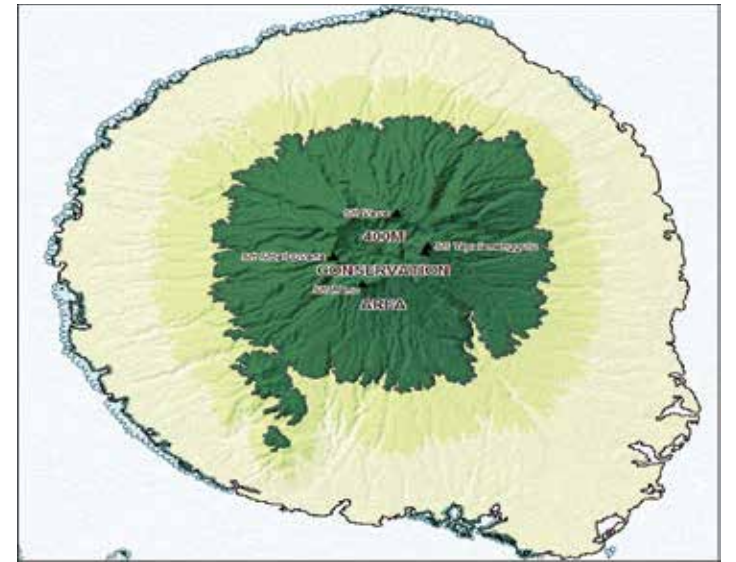
Itching to learn more, I talked with Ferguson Vaghi, the founding program coordinator of KIBCA. He said that the partnership with the logging company was based on common interest. Their nine year collaborative efforts have successfully been able to preserve and offset the digressive logging practices of forests found below 400 m, and give back to the local community. Unlike exploitive logging companies that focus on immediate profits, the majority of the profits of KFPL are returned back into the company as investments in infrastructure, community programs, and environmental monitoring efforts. However, Ferguson believes that the most important part of a successful sustainable logging company is community engagement and understanding.

Prior to the inception of this organization, Ferguson lead huge efforts to educate everyone on the importance of conservation and inform the villages on the island about KIBCA. Ferguson expressed that it was hard to negotiate terms of this shifting order on the island as it may impede the native traditional practices with various different tribes on the island. After much negotiation and compromise, they came to a unified agreement. This then resulted in an official declaration by the Solomons Minister of the Environment making all lands above the 400m altitude mark as an official conservation sight.

Currently the roles of KIBCA range from practice efforts to protect drainage areas from sediment runoff, confront and stop illegal international loggers, and outreach campaigns to the communities to ensure ground level support. Similarly, KIBCA conducts workshops at the Solomon Island National University (SINU) about sustainable forest efforts to foster a sustainable future.

A key message that Ferguson hoped to stress to the communities he works with is that there area always alternatives. Meaning, that over exploitive resource extraction methods are not the only way to earn a living; conservation is able to collaborate with industry. He believed that the Solomon Island has huge potential to switch into a tourism based economy due to their diverse tropical ecosystems. He hopes that Kolombangara will be an example to the rest of the Solomons how conservation is a possibility. For the future, Ferguson hopes that Kolombangara will soon be recognized as the first terrestrial national park in the Solomon Islands.

Alexandra Takeshita is a University of California student. She did a semester of study with the University of Queensland, Australia which included field research on Kolombangara Island in the Solomon Islands.



Top Kolombangara Island map, showing the conservation area above 400m. Above: Ferguson Vaghi (sitting) and team, after a biodiversity survey of high elevation forests.

Left Conducting surveys above the forest crater rim of Kolombangara's conservation area.

Kolombangara Island, located within the Western province of the Solomon Islands, is a unique example of how forestry industries are able to thrive alongside conservation efforts

WORDS BY [Julia Donath](#)

PHOTOGRAPHS BY [Julia Donath](#) & [Dylan Bush](#)

Chasing Clouds

Julia Donath has a brush with the splendor of a sky island ecosystem during a hike in the Solomon Islands.





It seems the best experiences in life erupt from the unexpected – we never know where our lives will take us, but I never thought mine would take me to the top of a volcano in the South Pacific with three classmates and my professor, equipped with minimal food and water, trudging in my delirium amidst a raging sinus infection. Yet there I was, hovering in the stratosphere, sitting atop an island on an island in the sky – numb to my throbbing sinuses and ill-preparation as I stared at the endless turquoise seascape, a beautiful manifestation of the journey it took to get there.

I remember the photograph as clearly as I remember that day – the image, a snapshot of ephemeral beauty, and that day, our journey to find it. Crowded around a table at our compound in Honiara, three of my classmates and I flipped through the pages of our professor's recently published photobook of the Solomon Islands. Visiting from the far-away reaches of California, it was just the beginning of our one-month stint in the Solomon Islands, where we'd come to study environmental and community health. As each image offered an exciting preview of the reality that was about to unfold, this photograph in particular grabbed our attention; although essentially everything in this book was unfamiliar to my foreign eyes, this was unlike anything I'd seen before. A vibrant panorama sprawled across the entire page, revealing a lush landscape alongside the sheer walls of a volcanic summit. Towering atop this mountain of dense rainforest and cavernous green hues sat an island in the sky. The dense canopy came to an abrupt halt, disappearing into thick clouds high above the island below. Moss cloaked the trees, and a soft, glistening mist filled the air, shrouding the trees in a fairy-tale-like veil. Treetops rested atop shortened trunks, no longer reaching for the sky because they were already there. Located in the very highest peaks of an island in the Western Province called Kolombangara, towering so high above

Hiking in cloud forest (page 66 - 67). *Kastom* or traditional rock of cultural significance (above left). Montane forest (above).

the forest below that the trees form an island of their own, this was a special and rare type of rainforest known as Montane – the cloud forest.

At that moment, we decided we had to go there.

I don't know how many times we asked our professor, originally from the Solomon Islands, if he'd take us - definitely enough times to drive him crazy, and apparently enough times to convince him - because a few weeks later, we found ourselves atop that sky island, peering down into the crater wall of Mt. Tapalamengutu, absorbed in the surreal, enchanting reality of that photograph.

Most of the Solomon Islands are blanketed in thick rainforest, containing some of the most biodiverse and unique terrestrial ecosystems on Earth. It is this incredible biodiversity that beckoned us to Kolombangara – yet our first glimpse of Kolombangara's rainforests was not of their beauty, but of their destruction. Intensive logging since the 1960s has dramatically altered the forested landscape of Kolombangara Island. This was the visceral reality we encountered as we arrived on the island's heavily logged shores, stepping off our boat directly into the middle of an industrial timber operation. Yet off in the distance, hiding high in the clouds above the ghastly carcass of a once-present forest, rose a lush peak. Our journey began there, high above the destruction at a place called the Imbu Rano Lodge.

Ascending above the desolation into the rainforest, we arrived at Imbu Rano, an eco-lodge maintained by the Kolombangara Island Biodiversity Conservation Association (KIBCA). KIBCA is a community-based organization that was actually started by a timber plantation company, established as an offset for their plantation to gain a Forest Stewardship Council certification. While heavy logging



1

2

3

4



1. Team of students with Ferguson Vaghi, coordinator of KIBCA. 2. Prehensile tailed skink (*Corucia zebrata*), the world's largest arboreal skink, encountered on the trail. 3. Geoffroy's roussette (*Rousettus amplexicaudatus*), a common bat of lowland forests. 4. Tired legs.

spans the lower half of the island, KIBCA manages the forest above an established 400-meter contour, promoting conservation while working with communities to find sustainable alternatives to logging. This week, their usual job of managing the forest also included managing us.

Nothing in life could have prepared us for that hike to the top, besides either being born in the Solomon Islands or possessing a burning, unrelenting determination to complete it – we had one out of two of those things. Our professor told us that he'd never completed this trek in one day, but given our remarkable detachment from reality and the adolescent gift of selective hearing, we held a burning optimism that it was possible.

In anticipation of the big day, our professor asked the coordinator of KIBCA and expert navigator of the mountain, Ferguson, to join us. As we entered the forest, two things became clear: firstly, Ferguson's immense passion and knowledge of the forest; and secondly, that he didn't know how far we were hiking. Stopping several times in the first kilometre for educational opportunities, what he thought was a quick bush walk transformed into a twelve-hour expedition up the volcano. Surprising, yet non-catastrophic - Ferguson gleefully completed the entire trek with no food, no water, and no torch, leaving us in the dust on the way back as he trekked down the mountain alone in the dark. Oh, and he did the entire hike in thongs!

The rest of us, on the other hand, weren't so prepared. We all forgot

food, and survived the day off of some crackers thankfully remembered by our professor. None of us brought enough water, and in addition to this, I was sick with an ear and sinus infection. I spent a few minutes that morning debating the intelligence of this decision as I counted enough antibiotics to stuff into my backpack for the day, pondering whether or not the unknown elevation gain would be enough to explode my congested sinuses. Yet despite our disheveled mess of self-inflicted hardship, nothing was enough to shake off our enthusiasm for the cloud forest. I self-prescribed myself a myriad of cold medicine and an anticipated good night's sleep, and decided it was a great idea.

Imbu Rano Lodge itself is situated in an expansive grassy area, surrounded on all sides by thick rainforest. Entering the trail is like stepping into another dimension – as soon as we began, we were absorbed by the rainforest. Trees towered above, covering us in cool shade as the sounds of the bush serenaded our journey. A full canopy enveloped the sky above, filled below with several layers of thick understory. The rainforest echoed with the noises and calls of the diverse array of organisms that inhabit its lower elevations. Large black ants – which we quickly learned inflict a nasty bite – as well as a variety of other fun insects, crawled along the diverse plethora of trees and flowering plants.

One of the most invigorating aspects of the rainforest is that just when you think you've witnessed the peak of its beauty, everything changes. Even the slightest elevational changes reveal striking changes

Practical Information



Getting there

Solomon Airlines & Virgin Australia fly between Brisbane and Honiara. Fiji Airways and Air Niugini, fly between Nadi and Honiara. All domestic flights to Munda and Ghizo are by Solomon Airlines. From here, a boat ride to Ringgi, and the Kolombangara Islands Biodiversity and Conservation Association Office.



Trekking montane cloud forests.

in species composition and tree height – as we continued up the trail, it didn't take long for the rainforest to change. Black ants haunted us for most of the hike – but as we transitioned upwards into the ridge forest, different species appeared and the trees began to change. Wandering our way up, we encountered several cultural sites as well; the volcanic slopes above Kolombangara's protected 400-meter contour contain not only some of island's most important habitats, but the majority of its cultural heritage as well.

The most noticeable change in the forest, however, was the abrupt disappearance of the maintained trail, which occurred approximately a third of the way to the top. This beckoned a new chapter of adventure in which the bush knife was now an absolute necessity to continue. Proceeding ahead, this marked the moment in which we were fully and truly swallowed by the forest. Large trees, root systems, and flora consumed the steep path ahead. I became a walking micro-biome, a veil of spider webs and other unidentifiable canopy life inhabiting my presence. It was akin to being underwater – fully immersed, tiny, and adrift in an expansive new world.

By this point, neither my professor nor Ferguson had released one drop of sweat, but the rest of us were beginning to understand why this isn't usually a one-day excursion. Stumbling our way up the mountain, falling became quickly normalized; we climbed over massive root systems, branches, and at one point, a felled tree that took several different approaches and attempts to navigate through. Apparently the Imbu Rano rangers run this "trail" quite often; my speed barely qualified as walking, and I thought I might plummet through a root system or disappear off the edge of the sheer ridge.

We started to run out of water. The path behind was now coated in the deluge from my throbbing sinuses, I'm pretty sure I had a fever, and our sad supply of crackers was dwindling. In search of water, Ferguson retreated to a nearby river with ease akin to walking down an aisle in the grocery store. A very short time later, he popped up behind us, unphased by his brief detour down the sheer edge of a cliff. Refuelled with river water and stale crackers, we ambitiously continued our journey up into the sky.

While I still don't know the exact distance of this hike, it was very steep – characterized by the rapid elevation gain we encountered over a relatively short distance, revealing

the rainforest's abruptly changing flora and fauna. Caused by a process known as the Massenerhebung effect – German for "mountain mass elevation" – the rainforest changed abruptly with just moderate elevation gain. As we climbed, new life entered the canopy as old life disappeared, revealing fresh surroundings in an experience akin to walking through time.

About five hours into our journey, the hot, humid air cooled. The path beneath our feet softened and was overcome with a carpet of small, white flowers: orchids. Tree trunks now welcomed friends - epiphytes - plants that live on the surfaces of other plants, in clever pursuit of the warm sunlight hovering above. Much to our excitement, trees began getting shorter.

Not many parts of the Solomon Islands reach elevations above 400-meters, making both the conservation area at Imbu Rano

While islands in general exhibit high levels of endemism, the sky islands drive additional endemism of their own, containing unique species that only exist at their remote locations in the sky.

and the cloud forest special and rare places. Located on only the highest ridges and peaks, upper montane rainforests are so high that they form islands of their own: sky islands. While islands in general exhibit high levels of endemism, the sky islands are so high up that they drive additional endemism of their own, containing unique species that only exist at their remote locations in the sky. The upper montane forest is also characterized by stunted tree height, smaller leaf size, and an open understory, as well as an abundance of mosses, epiphytes, and fungi. Although the lower montane forest occurs at surprisingly low levels throughout the Solomon Islands, entrance into the magical realm of the upper montane forest is striking and abrupt.

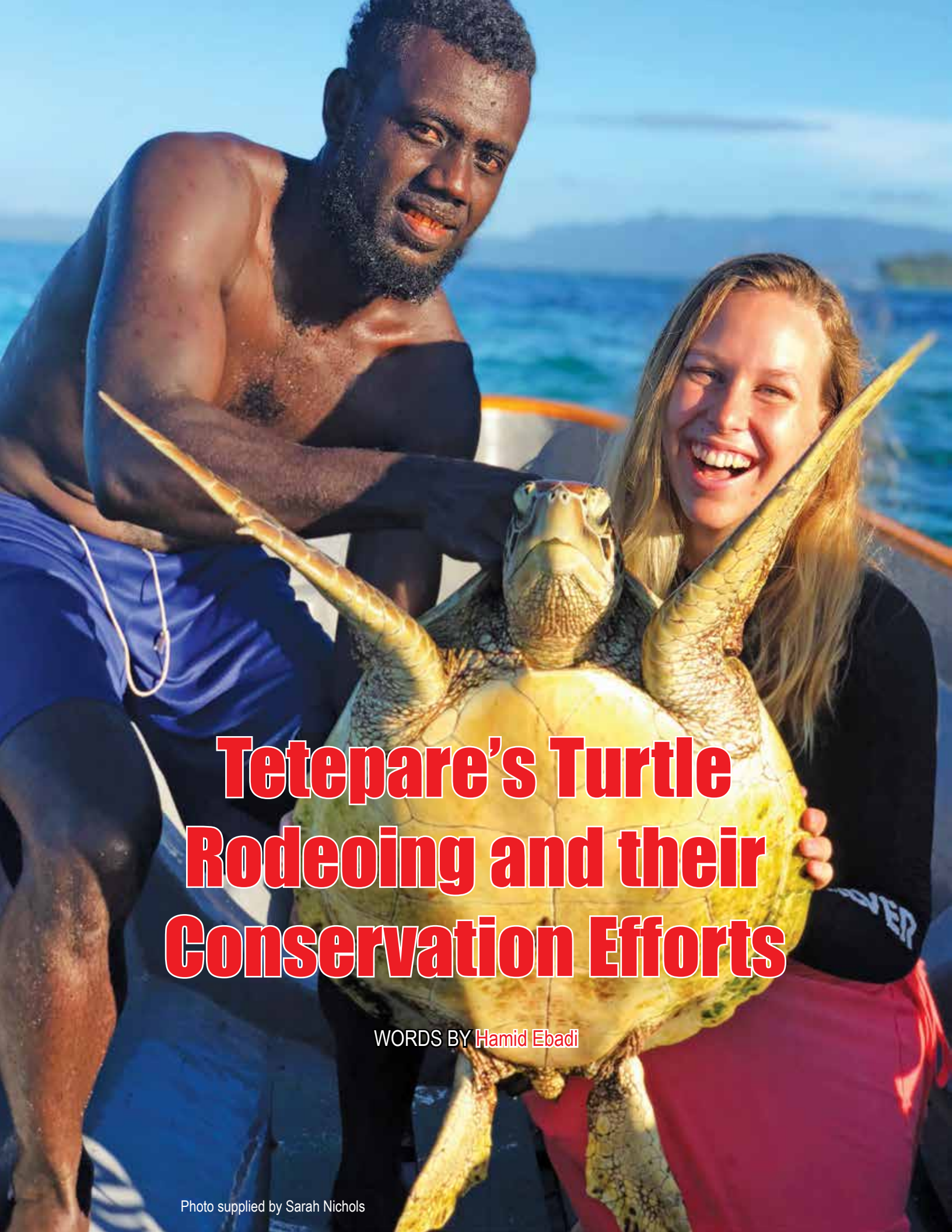
There comes a time when completing a long hike that the mind locks into an almost meditative state. Just keep walking - Torowe leg, as my professor said to us in pidgin. We kept walking. Suddenly, however, after a long, delirious, and seemingly endless venture upwards, our preconceived visions of the cloud forest manifested into our surroundings. We were so deeply humbled by this point that it didn't seem real, like the

forest was taunting us with false gratification; yet as we continued, dense shrubbery erupted into the sky, sunlight breaking through stunted trees and dancing across the exposed ridge. Plumes of moss engulfed the tree trunks, coating the entire forest in a soft, colourful haze. The air was cool, and the ground was soft – it was such a beautiful, surreal, and magical place; it felt like my surroundings were glowing. The insidious black ants – along with other insects – seemingly disappeared, and the forest evoked a peaceful silence. The photograph in the book had gripped me in a profound way, but the beauty of becoming part of it brought an indescribable joy. It was one of the most unforgettable moments of my life.

Ecosystems change over time, fluctuating with the natural rhythms of evolution and biological shift – yet our extensively long journey brought us to a place that was unfathomably still and frozen in time. It was a world as peaceful and still as the photograph. Isolated in the sky, the cloud forest floats in pristine stillness compared to the dramatically altered landscape below, where the abrupt perturbations wrought by human impact beckon a sudden end to over 200 years of slowly changing forests. I peered down at the world below – I looked where the turquoise waters meet the dark murk unleashed by logging runoff. I looked at the barren hills, at the dreary roads weaving from one logged patch to another, the skeletons of trees teetering in the backs of large trucks. Then, I looked at the magical forest of glowing, untainted trees sparkling with the reflective mist of the clouds. I wondered how high up a tree has to live to escape being chopped down.

It takes walking through the rainforest to see that logging isn't just extracting trees, but razing a unique and expansive world to barren smithereens. As the late afternoon sun kissed the horizon and we began our descent down from paradise, I took one final look at this magical place, trying to memorize the magnificent stillness of a moment I know is destined by Earth's biological clock to change. KIBCA has fought long and hard to preserve this immaculate space. In the context of such persistent exploitation lingering below, preserving this special place may be a difficult pursuit. I pray to the heavens atop the clouds we reached that day they do.

Julia Donath is a University of California student, who conducted Environmental and Community Health research in Solomon Islands under a study abroad program by the University of Queensland.



Tetepare's Turtle Rodeoing and their Conservation Efforts

WORDS BY Hamid Ebadi

Photo supplied by Sarah Nichols

The reflection of the early morning light shining on the uneasy waters of the reef hit the lens of my glasses, making it difficult to see into the shallow benthic layer of the waters. I was on a boat with seven other student researchers investigating the reefs for turtles. Joining us, we had professional turtle 'rodeo-ers' who've been trained in the physical handling or catching (or 'rodeoing') of turtles.

Our purpose there was really just to observe and be exposed to this survey method. As we crossed the open reefs scouring for turtles I recalled in one of my university lectures how dugongs and turtles had high mortality rates due to the turbines of the boats that breeze over the shallow waters and held onto the boat in fear. "These are experts" I reassured myself, "they know what they're doing" our eyes widened when one of them pointed to a dark object under the waters in anticipation and excitement.

Suddenly one of the crew members dove into the sea, rustling and shaking with the dark object. Without warning, the diver rose triumphantly with a green turtle in his arms and both hands on the shell – one near its neck and the other on its bottom.

The turtle was wiggling its arms from what seemed to be, from an unexperienced observer's eyes, an uncomfortable position. I later found it was a sub-adult, like most found here at the reefs. They begin at about 3 years of age as juveniles swimming on the surface of the deep oceans and transition into sub-adults migrating to nearshore waters to inhabit reefs and seagrass pastures.

After the whole experience, I interviewed one of these turtle rodeo-ers, and island ranger, Kennedy Soapi, who'd been working since the start of Tetepare as a local homegrown conservation initiative in 2002. This is where I learned what a rodeo really was. It has two purposes: the first, as any rodeo, is a performance meant to allure and capture the turtle. The second is to continue tagging them as part of the monitoring program. He tells me that Turtle monitoring began in 2004, when specialists came together in Gizo to understand the traits of the indigenous species of turtles in the Solomon Islands. There, workshops were held especially for NGO's in conservation to train others how to work with turtles. Specifically, how to monitor them and understanding key traits like their life cycles (ex. Out of 1000 eggs, 1 survives). Monitoring involved



tagging, and there are primarily two types used at Tetepare: 1 is a metal clip often composed of inconel and attached to the flipper close to the axilla (armpit). Second is the PIT (Passive Integrated Transponder) tag and are injected into the muscle or under the skin using a needle to the neck to insert a rice-sized device that when read with a scanner, will indicate a unique alphanumeric

Extensive harvest for meat has caused severe decline in great turtle numbers, but their populations are recovering where they have been protected. Conservation methods currently in place include MPA which is ~13km in length at Tetepare, creating a great natural nursery.

code as an ID. The purpose of this tagging is to visualize and understand the growth by comparing previous records and evaluating the changes. This comparison is the primary form of analysis.

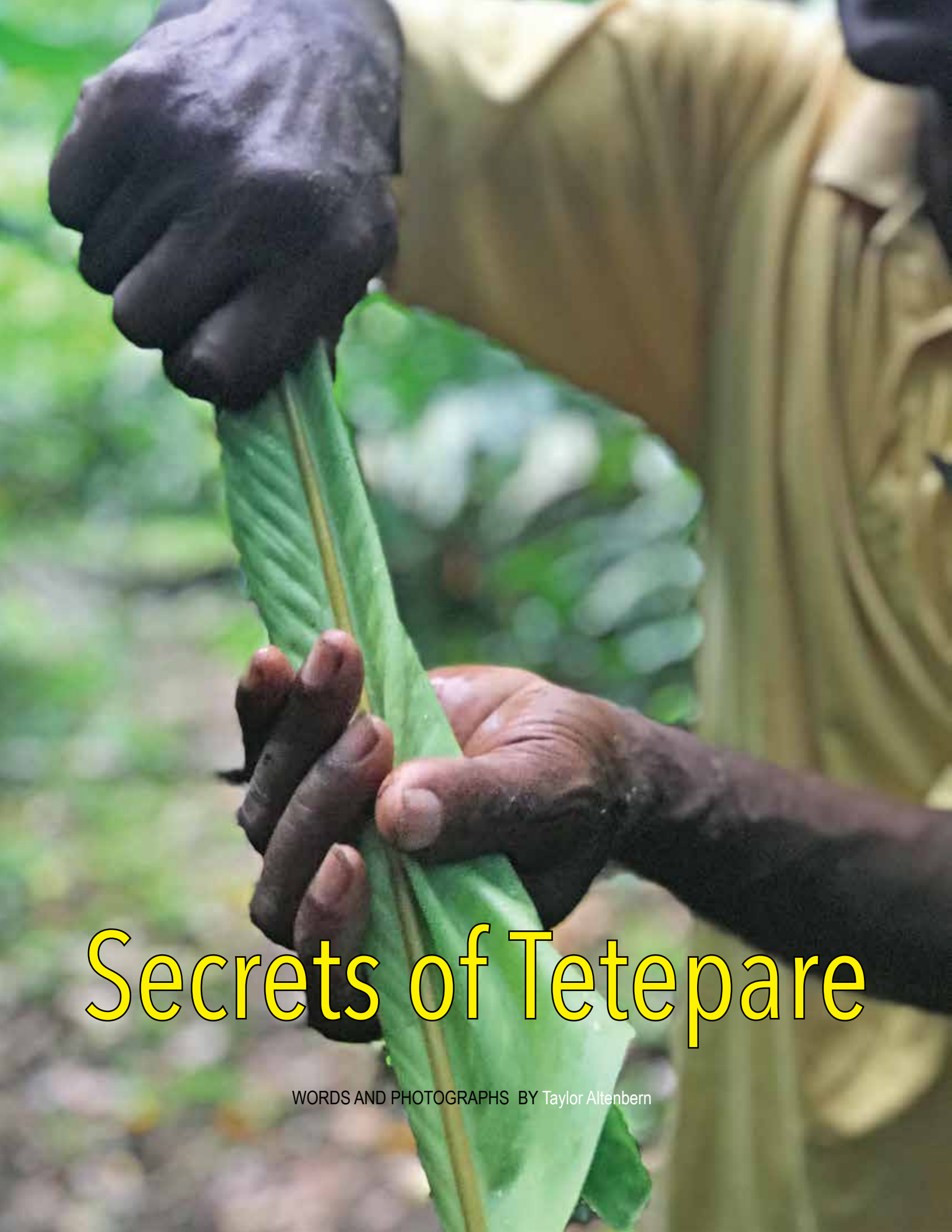
So, I asked ranger Kennedy once this information is gathered, how clear is the path from data recovery to policy changes in local, state, and national governance? Kennedy says, "this is our greatest failure." For him, this is a major concern because he argues the government shows apathy towards conservation of turtles meaning no efforts for change. All the conservation efforts that Tetepare hosts aren't supported by the government despite the existence of the ministry of conservation, who fails to represent Tetepare's conservation projects. A priority recommendation to enhance the efforts of conservation is to have a national shift on conservation through government by using scientific data to influence bureaucrats. Although data collected is not sent to the government, it is still used for grants and funds. If data is sent late, then the funds

will be sent late. The core request from donors which fund most the conservation work done on Tetepare is this data. Without it, there would be no aid. A secondary recommendation would be to influence NGO's and donors to partner with the government to alleviate dependence on donor aid while also creating stronger government to conservation NGO relations.

Extensive harvest for meat has caused severe decline in great turtle numbers, but their populations are recovering where they have been protected. Conservation methods currently in place include MPA which is ~13km in length at Tetepare, creating a great natural nursery. Over harvested areas are harder to find due to measures like seasonal closures in fishing, and the patrolling and recording of harvests. Selling and eating turtles are nationally banned, but this doesn't always prevent poachers from trying.

Fortunately, there are meetings from various organizations like the TDA to help fight against this. Ultimately, noticeable results have been made from seagrass to fish which can even be seen on other islands, demonstrating the effectiveness of their conservation methods. In 2004, Kennedy states you'd be lucky to spot one turtle at Tetepare. Two years after the turtle conservation program began, they were being spotted and now it's difficult to count because there are so many. In fact, most catches are new turtles rather than old recaptured ones. "This is a big change", ranger Kennedy emphasizes. I finish the interview with a sense of security in the progression in livelihood for the turtles here on the island, but dismay that it's limited to the shores here.

Hamid Ebadi is a University of California student. He did a semester of study with the University of Queensland, Australia which included field research on Tetepare Island the Solomon Islands.



Secrets of Tetepare

WORDS AND PHOTOGRAPHS BY Taylor Altenbern



Tetepare Island is known as the wondrous, uninhabited island on the edge of the Solomon Sea, where the few humans who roam are the rarest species on its grounds. Tumi is one of those rare humans, frequenting the island as a ranger to protect the valuable species who inhabit its land and seas. Tumi knows better than most the value of the flora and fauna found on the island. On a short walk through the lush forest, Tumi describes the traditional medicinal uses of each plant, and exemplifies the rich knowledge, connection, and stewardship for nature found amongst his people.

The soil beneath our feet was almost black. It gleamed in the light, revealing its moisture and thickness like that of pottery clay. Layers upon layers of fallen leaves scattered the fertile earth, revealing their age with their various hues. The deep yellow leaves, nearing the end of their life, were snugly embedded into the soil. Soon they would disappear into its flesh, never reaching death but living again and again endlessly. Above our heads was a Sistine Chapel of tree cover, laced with vines and speckled with beams of light that poured in through small gaps in the green ceiling. Everything was living, was breathing, was begging to be felt.

Tumi's hand reached for the stem of a fern, plucked it, and held it out in front of his chest. "Yeeri leaves", he called them, when cooked over a hot rock, form a paste which helps to relieve cuts and prevent infection. He shifted onward down the trail, barefoot and with ease. We carefully followed suit, dodging jagged rocks and bulging tree roots which weaved in and out of the trail. He pointed to another leaf, "Temenalia" (*Terminalia* sp) was its name. When pounded, the leaves form a milk, which women use to clean themselves after giving birth. His palm grasped a neighboring branch, and with his formidable bush knife in hand removed a single stalk of the Gova plant from its body. He tenderly skinned the stalk with his knife, revealing its raw dripping flesh. "For pikininis," he said, "you must scrape the meat of the stem into a leaf, roll it up and drink," he demonstrated as he spoke. For adults, he explained that

the stem could simply be chewed. He extended a piece towards me, a cordial offering from both Tumi and the plant. I gripped its fibrous rib with my teeth, allowing its bitter taste to fill my pallet.

Tumi, when asked about the source of his abundant knowledge, spoke fondly of his mother who he assigned credit to for his expertise of the forest. She lived to be 110 years of age and used the medicine of the forest throughout her lifetime. "Now people do not care," Tumi iterated with dismay, describing the increasingly apparent loss in ecological knowledge within his community.

As western medicine becomes more available, despite its often unaffordable cost, less people are likely to turn to the forest to cure their ails. As steel roofing becomes more popular, less youth are instructed on how to forage, heat, dry and weave the Pandanus leaf for housing. Tumi describes this not only as a potential detriment to the wellbeing of his community, but as a loss of cultural identity.

The way that Tumi spoke of plants like old friends made me wonder how many beings I could knowingly point to during a bush walk in California. The richness of local ecological knowledge capsuled in the mind of Tumi, and others like him, is something that should not go undervalued. Studies have repeatedly shown that the more knowledgeable a community is of their land and its species, the more biodiverse that land remains. Maintaining the abundant knowledge of these plants not only benefits the people that use them, it promotes the livelihood and conservation of the plant itself.

The trail began to thin and squeeze, and soon even the shortest of us were ducking under long, horizontal branches that stretched to meet the edge of the coast. The earth beneath us gradually lost its deep umber tone, and fragments of shells began to scatter the ground. A familiar aura of crisp salt traced our skin and tickled our noses. Tumi's feet had come to a stop, and, we looked up, we were met with the sound of clinking coral on an inlet of shoreline.

Taylor Altenbern is a University of California student. She did a semester of study with the University of Queensland, Australia which included field time on Tetepare Island in Solomon Islands.

Understanding Plant & Kastom Knowledge in Tetepare

Traditional Ecological Knowledge (TEK) is best defined as a “cumulative body of knowledge, belief and practice, evolving by adaptive processes and handed down through generations by cultural transmission” (McCarter et. al, 2014). Unfortunately, over the last few generations, a decrease in the Solomon Islands TEK tradition, also known as kastom, has been observed and Western influence from globalization is thought to be a major contributor to this change. In our Education Abroad Program (UCEAP), myself and sixteen other University of California students had the privilege of visiting Tetepare, the largest uninhabited island in the Solomon Islands and South Pacific. Humans themselves are considered the most rare creature there. Conservation representatives, including eco-lodge leaders Mary and Twomey Ben, welcomed our group to the one and only place to sleep on the remote island. Twomey and Mary formed a true power couple with great Tetepare pride, knowledge, and a humbling presence. On our first full day in Tetepare, it was fascinating learning from Twomey out of the blue about the many trees and plants along the path towards Crocodile Lake and how they are much more than just visual components of a pristine environment. His knowledge on plants multi-functional uses sparked an interest in many of us and led me to ask him for a short interview to learn more of his own TEK. TEK can encompass ethno botanical concepts, the using of local vegetation in a bio-diverse area where natural resource use supports populations for many generations. Twomey, 54, has been working with the eco-lodge project for 15 years with his wife. He is in charge of building and maintaining the place and has proved to be a walking encyclopedia.

Elena: *Who taught you all of this knowledge?*
Twomey: *Mostly, my grandmother but also my mother. My grandmother died at 110 years of age and still had teeth of her own at that age.*

Elena: *When did you first start learning about*

medicinal plants?
Twomey: *In Rendova where I grew up. I would go with my grandmother and mother to the garden and they always talked to me about kastom medicine. I was maybe 12 years of old.*

Elena: *And how are you able to recall all this knowledge over the years?*
Twomey: *Based on experience and recognizing the plants at each place. I have never written any of the information down.*

Elena: *Do you have kids and plan to pass this information on to them?*
Twomey: *Yes I have three kids and plan to share everything with them. Young people do not know kastom medicine well and hospital medicine can also be very expensive.*

Elena: *If you had to guess, how many plants do you think you know that work for medicinal, technical, and other purposes? (Asked for a range).*
Twomey: *Maybe 20-50.*

The following list of plants and their accorded Methods of Use were collected in a span of just 3 days, finding it hard to believe that Twomey thinks he knows only up to 50 plants functional uses. Plants are either labeled as ‘Medicinal’ or ‘Technical’. The majority of plant names were recorded in the local language of Roviana and some may not be spelled correctly because no further revising or follow up was done on the accuracy of this information. Not all of the Methods of Use were mentioned or recorded for all the plants in the time spent with Twomey and the following information is not encouraged for use but is merely shared because of its ability to represent one Solomon Islander’s TEK experience.

Twomey’s concluding thoughts on kastom medicine presented an interesting point of view. “Belief is really important in kastom medicine. If you believe and trust the medicine, it will work. People sometimes don’t trust it can help them but if you let it and accept its function it will heal you.” We both agreed on how important the

WORDS BY Elena Aguilar

power of the mind and heart is in treatment. Nonetheless, whether some of the plants used in TEK practices have been recognized to be effective or not by Western medicine, the process of passing this knowledge through generations represents a unique aspect of Solomon Island culture. There is no doubt that immense respect emerges from the thought of directly utilizing our natural environment first-hand. Mass development has dramatically divided humans from their natural environment and getting to know the people of the Solomon Islands and their close ties with nature is certainly appreciated.

Name (local)	Type	Treatment	Method of use
1. Half flower/skevola	Medicinal	Malaria	
2. Boe	Medicinal	Blood circulation/bruises	
3. Culifilum	Medicinal	Clean eyes	
4. Hasi	Medicinal	Upset stomach	Grind the plant, put into cloth, strain & drink small amount
5. Local ginger (big leaf)	Medicinal	Cough, high fever in babies	Peel stem, carve out the flesh inside the stem
6. Vehu/vihu	Medicinal	a. Broken bones b. Blood clots	a. Boil in water in pot until fluid turns red. Press directly onto affected area & massage gently b. Warm single leaf in fire and press gently onto affected area
7. Pandanas	Technical	Kastom umbrellas, fans, hats, baskets, mats	
8. Koe bark	Medicinal	Energy and resilience for long work days	Cut pieces of bark, boil until water turns red and drink
9. Arara	Technical	Kastom fishing	Use as a net to gather fish schools together
10. Tita tree	Technical	Kastom glue (putty nut)	Used for gluing to fill any broken gaps and edges in wood e.g., canoe repairs
11. Malaina	Technical	Wood for building	Very strong wood for building furniture and canoes
12. Sago palm	Technical	Building materials	Commonly use to build roofs
13. Germinating coconut seed	Technical	First aid/safety	Makeshift gauze
14. Kuivili	Medicinal	Menstrual cycle	Helps regulate atypical menstruation patterns
15. Lise	Medicinal	Afterbirth care	Leaf is smashed until soft, put into clean cloth and dip cloth in warm coconut cream/oil to clean mother
16. Traus	Medicinal	Thras conditions in newborns	Helps clean the tongue
17. Muisi vine	Medicinal	Closing large cuts	Sap is used like a glue
18. Yiri fern	Medicinal	Kills germs	Warm with a hot rock and apply to area that is cut or infected
19. Noni tree	Medicinal	a. High blood pressure b. Heals boils	a. Boil young leaves, drink the water or can also chew the seed b. Heat the young leaves and press onto the boil to take puss out.
20. Coconut leaves	Medicinal	For small cuts	Bend leaf and squeeze it directly onto cut to fill germs.
21. Toti plant	Medicinal	Cough or sinus blockage	Extract the liquid and drink in small amounts
22. Tuisi tree	Medicinal	Toothache and germs	Boil the bark in water, swish it around in mouth and spit out.

Elena Aguilar is a University of California student, who conducted Environmental and Community Health research in Solomon Islands under a study abroad program by the University of Queensland.



Grassroots Approach to Marine management

Coral reefs and seagrass meadows surround the tiny island of Nusatuva, just off the larger volcanic island of Kolombangara. The community that lives here are eager to management the marine resources that surround them, and to ensure that these remain for posterity. This has not come without it's challenges.

WORDS BY Sarah Bixler

PHOTOGRAPHS BY Sarah Bixler & Julia Donath



Off the coast of the dormant volcanic island Kolombangara, lives a small island named Nusatuva. Its beauty is thriving, reflective of the many islets seen throughout the Solomon Island’s archipelago. One swim along the coast of the southernmost village Onma is visually captivating. The reef, although sensitive to temperature and salinity shifts, is beaming with massive and soft corals, *Linckia laevigata* and *Choriaster granulatus* sea stars, sea cucumbers, biofluorescent clams, and a plethora of colorful fish. Nusatuva could be easily lost in the sea over 900 islands across the Solomon Islands, however it stands out amongst the rest. It is set apart by its people and their passionate mindset for change.

In 2004, the community began to advocate for a Nusatuva Marine Protected Area (MPA). An MPA is a dedicated area of the ocean, where the marine resources are deemed for protective management to preserve biodiversity and in some cases its connection to cultural heritage. MPAs are situated legally either by the government or other effective measures. In the case of Nusatuva, the community approached World Wildlife Fund (WWF) after a distributed public notice informed communities around the Solomon Islands about the means of conservation. They had heard of some other conservation projects happening nearby, such as fishing conservation on Ranongga island, which aided confidence in these conservation tactics. It all began with letters, sent to WWF to prove their telling argument.

Eric, a slender old man residing in the Onma village exclaims his love for coral, fish and shells. In asking how the MPA initiated, he expressed his influence. Eric believes by sharing his passion to care for the environment and the sea ignited this mindset in the rest of his family and community. Eric says environmental protection, “is a very good thing.”

Duncan, Eric’s son-in-law and the chairman of the newly created Nusatuva Environment, Conservation, and Development Association (NECDA) Management Committee, started devising a plan in 2004. His work with Kolombangara Forest Products Limited (KFPL) for 15 years and active engagements with other communities and organizations over time developed his robust understanding for sustainable resource management.

In an interview with Duncan, he emphasized, “To be sustainable, always look at things in alternative ways. Think of the

next generation.” So the NECDA established six main objectives: savings, ecotourism, fishery management, healthy water supply and sanitation, education, and agriculture. With these points in mind, the community focused their efforts to maintain their reefs, and provide their people a rich value of environmental and community health.

It took a long three years to complete the MPA, because of the many debates and disagreements between local fishermen. Although the journey did not come easy, the WWF granted the request and established Nusatuva as an MPA in 2007. The tension between fishermen and legal enforcement proved it takes community initiative to protect this area. Duncan’s key to success has been engaging people to create ownership. He explained, “Once there is a community response, then the people can begin to organize themselves and create an influence for change.

Specified in the Nusatuva Management Plan are the details of fishery closures around the island. Most consist of permanent closures, one seasonal closure, and coastal mangrove protection. The largest permanent close is 0.476 square kilometers (sq kl) (40.7616 hectares). The smaller permanent closure is 0.0115 sq kl (1.1465 hectares). In total this makes 41.9 hectares of permanent closure of water around the island’s coast. And seasonal closure area on the islands western side, about 0.0559 sq kl (5.59 hectares). Nusatuva mangroves surround much of the coastline and is also a protected resource, outlined as 0.0374 sq kl (3.7364 hectares). The management in total covers 47.5028 hectares of area protected. Sese, a local community elder, serves as the permanent fishing ranger for the island, overseeing these outlined sites.

Throughout the years, the WWF has continued to visit and show the community how to record and monitor their species. Soon enough, doors of new opportunities were opened. Coral farming and cultivation were taken up by women and children, who grow the corals in their pristine environment to later sell in Gizo. To do so the community worked with World Fish Centre. This organization

focuses on assisting communities by generating marine products and assisting resource management. After NECDA gathered the material, it only took two months to grow corals ready for export. Although funding for this project has since ceased, participation provided locals with invaluable micro-financial experience.

Together, with the help of WWF, and other partnering entities including USAID, Coral Triangle Initiative in Coral Reefs Fisheries and Food Security, Solomon Island Government, and Coral Triangle Support partnership with Nature Conservancy and Conservation International, the community of Nusatuva successfully transformed their island home into a protected and managed resource.

Despite the preparatory planning, some events were out of Nusatuva’s hands. Since 2007 the island has been hard hit by two environmental disasters. A tsunami in 2007 destroyed a proportion of marine life, and fortunately it recovered fairly quickly after the salt water receded. However, heavy rains in 2012 flooded the corals

with freshwater and sediment runoff from the mainland, ruining much of the area. Three meters deep of fresh rainwater infiltrated the island’s waters. The community was devastated. Rinda, a lively and amiable woman from Onma professed her grief. She was in Honiara at the time of the floods, and wept at the loss of her treasured clams.

Since, there is noticeable yet slow regrowth of these organisms. Eric proclaims he is not discouraged exclaiming, “me no give up!” They are known for their motto, “Kipim gud olketa risos blo uimi,” which translates as “Keep our resources.”

Last year in late May (2017), Rinda traveled to New York as a representative part of the Solomon Islands WWF team to an international conference. As one body, the people of Nusatuva are a testament of resilience, endurance, and an exemplary community pursuing a long-lasting impact.

Sarah Bixler is a University of California student. She did a semester of study with the University of Queensland, Australia which included field research time in Nusatuva and Kolombangara in the Solomon Islands.

Nusatuva could be easily lost in the sea over 900 islands across the Solomon Islands, however it stands out amongst the rest. It is set apart by its people and their passionate mindset for change.

Conservation in the Solomon Islands

Acts without Action

WORDS BY Natalie Myren

The Solomon Islands is a nation, which though small in population, carries a great weight in terms of biodiversity and aesthetic and cultural richness. Many species that live within the islands are found nowhere else; the World Wildlife Fund reports that the rainforests there are characterized by “high vertebrate endemism”, especially among birds.

Since the turn of the 20th century, however, some of these unique species have been threatened by logging operations within the nation, permitted under the 1969 Forest Resources and Timber Utilization Act. In response, new legislation has been introduced to curb logging and facilitate sustainable resource management within the nation, but impact of this may be hampered by what a former board member of the Solomon Islands Community Conservation Program characterized as a “policing” problem, whereby policy may be insufficiently enforced to be effective. This article serves to give an overview of the legal framework structuring conservation policy within the nation, and also to raise

questions as to the role of law in resource management. How might we structure conservation practice to legitimize and protect sustainable resource management initiatives if not via law?

Nationally, there are several pieces of legislation in play when it comes to resource utilization and management including the 2010 Protected Areas Act, 1969 Forest Resources and Timber Utilization Act, 1998 Environmental Act, 1998 Wildlife Protection and Management Act, 1996 Mines and Minerals Act and 2015 Fisheries Management Act (which replaced the

previous 1998 Fisheries Act). Of these, the Forest Resources and Timber Utilization Act and Protected Areas Act are especially important to determining and managing resource use today.

The 1969 act is significant in that it enables resource extraction with relatively few control mechanisms, perhaps reflecting a time of writing that held more regard for economic interests than the sustainability of resource use. Within this act there are some articles ostensibly offering environmental protection by granting the establishment of

state forests and forest reserves, but the protections granted are not extensive, not necessarily permanent, and in some cases only apply to future action.

The 1969 act is significant in that it enables resource extraction with relatively few control mechanisms, perhaps reflecting a time of writing that held more regard for economic interests than the sustainability of resource use.

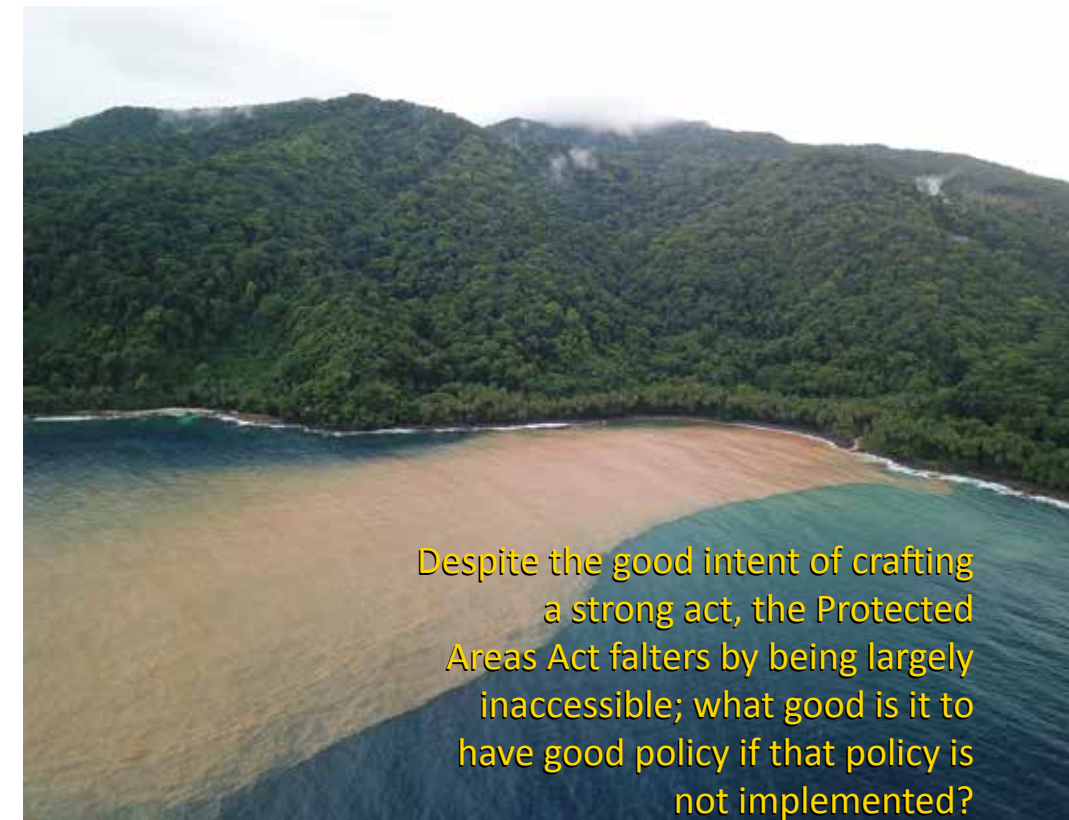
This means that pre-existing contracts to harvest resources in lands declared a state forest would still be honored despite the change in status. There was a bill proposed in 2012 to replace and update the act but it did not garner adequate support in parliament.

The 2010 Protected Areas Act was introduced as a stronger piece of legislation for managing and categorizing areas with significant biological, genetic, geological or cultural value, or those that are especially rich in biodiversity or vulnerable to change. The benefit of this act is that it

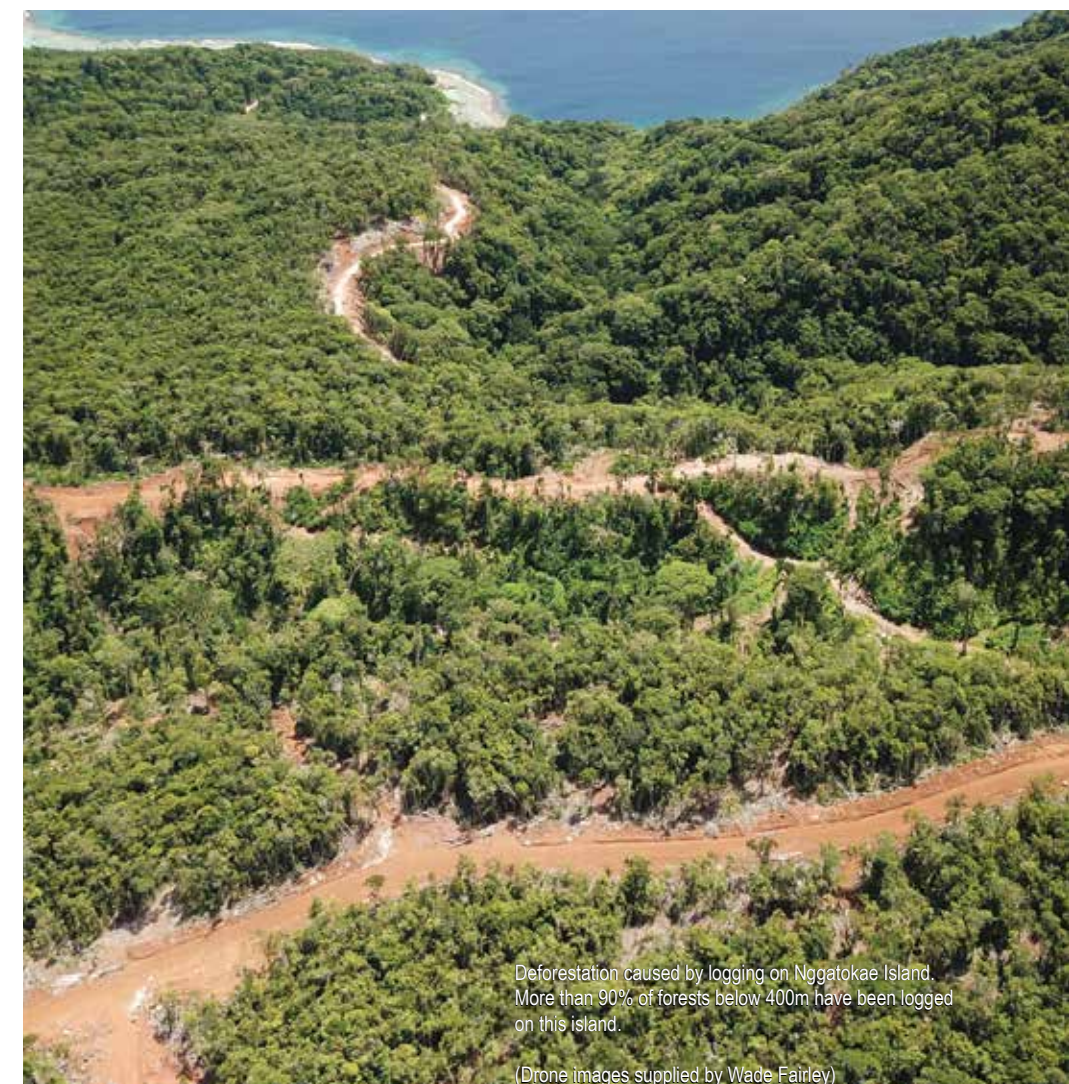
established categories of conservation with greater legal weight and governmental obligation for advocacy and, if necessary, prosecution. It also set up a governmental registry of protected areas and a fund that is earmarked for use in service of these registered protected areas. The difficulty with this legislation is that verification and subsequent establishment of legal status is a lengthy procedure that may take significant time and resources, which smaller conservation organizations may not be able to provide. Since the introduction of the act there has been only one successful petitioning for inclusion, by the Arnavon Islands in partnership with the Nature Conservancy: the nation’s first national park.

Despite the good intent of crafting a strong act, the Protected Areas Act falters by being largely inaccessible; what good is it to have good policy if that policy is not implemented? For initiatives and situations that both fit within the Protected Areas Act’s categories of inclusion, and have the time and resources to undergo the process of registration, the act offers a perfectly reasonable pathway to environmental protection. For others, there are ways that the state could establish a system with greater decentralization of resource management authority that encourages grassroots organization instead of relying on legislation. If implemented, changes could take many forms, from giving greater authority to rangers, to dedicating more public resources towards grant writing, to facilitating or sponsoring community conservation agreements. Existing examples of local conservation initiatives, such as the Tetepare Descendants Association, or the Kolombangara Island Biodiversity Conservation Association this demonstrate that the power of the individual or organization can be significant, even in the absence of formal legal authority. While law and legal action can and should be a method by which some organizations seek protections and security in conservation operations, this article should demonstrate that the benefits granted are not extensive or all-inclusive, and that local grassroots organizing should still be supported and applauded as a valid and effective form of sustainable resource management.

Natalie Myren is a University of California student. She did a semester of study with the University of Queensland, Australia which included field research in the Solomon Islands.



Despite the good intent of crafting a strong act, the Protected Areas Act falters by being largely inaccessible; what good is it to have good policy if that policy is not implemented?



Deforestation caused by logging on Nggatokae Island. More than 90% of forests below 400m have been logged on this island.

(Drone images supplied by Wade Fairley)



The best and most accessible overland bush trek in Solomon Islands, Kolombangara

kolombangara.org