CEPF FINAL PROJECT COMPLETION REPORT

Organization Legal Name:	University of Adelaide
Project Title:	Threatened Endemic Plants of Palau
Date of Report:	30-June-2011
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CEPF Region: Polynesia-Micronesia

Strategic Direction: 3. Safeguard and restore threatened species

Grant Amount: $ 36,050

Project Dates: May 1, 2010-Apr 30, 2012

Implementation Partners for this Project (please explain the level of involvement for each partner):

Belau National Museum: The Belau National Museum was the primary host and collaborator for this project providing office space, field-lab space, access to the natural history collections, and use of truck for field work. The BNM herbarium curator, Ann Kitalong, assisted with field logistics, planning and organization of meetings and vehicle logistics. The BNM natural history section technician Van Ray Tadao assisted periodically with field work and routinely with logistics in the field-lab and collections and the Natural History Section manager, Alan Olsen, helped with determining species IDs for insect photos during the pollinator study. PALARIS, Palau's national GIS service assisted with mapping presence absence data and estimating total area of occurrence for species inventoried. The local state government of Ngeremlengui provided field assistance for the *Parkia* survey. We also hosted a couple meetings to stimulate interest and initiate action on long term biodiversity inventory and progressing Palau's Endangered Species Act. Numerous Palau organizations attended these meetings (See below).

Conservation Impacts

Please explain/describe how your project has contributed to the implementation of the CEPF ecosystem profile.

Please summarize the overall results/impact of your project.

Planned Long-term impacts - 3+ years (as stated in the approved proposal): Progress in understanding of Palau's endemic plant biodiversity is obtained through a network of local community members and international research collaborators. Knowledge of species distributions of all Palau's endemic plants is achieved through standardized long term survey methodologies and coordinated data management. These resulting data will enable researchers and community members to make better informed decisions about biodiversity conservation in Palau and network with other small island nations in the Pacific with similar biotas and threats.

Actual Progress Toward Long-term impacts at Completion:

Summary:
Numerous collaborations were established throughout the course of this project (see below). Specific progress in the knowledge of the species distributions was obtained for a total of 15 of Palau's endemic plants (See Component 2) and through our hosted meetings and public talk at the Belau National Museum we communicated the aims and preliminary results of the project thereby emphasizing the importance of a continued effort to document Palau's endemic flora. Field trips during the project were often made in joint efforts with other agencies, which further promoted our ongoing research. Through our collaboration with the University of Hawaii – our aim to progress Palau's capacity for data-basing its biodiversity collections was achieved beyond our original aspirations. With local agencies we discussed options and methods for long-term survey efforts to continue this work and it was determined that ample internal funds were available through Palau's green tax initiative to support the continuation of such work. Progress in getting a local agency to take the lead on starting a new proposal written up was not made during the project term however, a NSF grant was submitted in collaboration with the New York Botanic Garden to fund further collecting in Palau in previously unexplored areas.

Several new collaborations were established with international research collaborators through this grant. These include:

~ Jolie Liston, Senior research scientist, Australian National University
Jolie collaborated with us on our paper "Using the ancient past to establish threat in poorly inventoried regions" (Attachment 1) by providing an extensive dataset of archaeological evidence which helped form the basis of our argument for long term decline in forest cover on the Palau islands and the anthropogenic origin of savannas. This unique paper advocated an interdisciplinary approach combining expertise of two traditionally separate disciplines; botany and archaeology, and the consideration of population declines extending beyond the modern era into the archaeological record.

~ Akiko Iida, PhD student, University of Tokyo, Japan
Akiko collaborated on the "Using the ancient past to establish threat in poorly inventoried regions" paper by also providing modern evidence of forest cover loss. After this project was complete we used the data from her PhD thesis to form the basis of a second IUCN submission attempt for Palau's endemic plants (Attachment 2). Her thesis compiled an extensive dataset on forest cover loss since the Japanese era from 1921 to current and enabled us to justify listing of Palau's endemic plants as Vulnerable under IUCN Criterion A2(c).

~ Dr. Michael Thomas, the Curator of the University of Hawaii's herbarium
Michael received a NSF grant to database all herbarium specimens in the Pacific Islands and make the data publically available through a website (www.pacificherbaria.org). This was an enormous contribution towards the aims of this project. The data will all be standardized across the Pacific and facilitate progress in understanding distribution of species, their taxonomic boundaries, and networking between small Pacific institutions.

~ Timothy Gallaher, PhD student, University of Hawaii
Timothy is making a very big direct contribution to the aims of this project by defining species boundaries of Palau's *Pandanus* species through genetic techniques. This in-kind contribution is helping both the immediate short-term goals of the project and the long- term impacts.

~ Dr. Tim Utteridge, Royal Botanic Gardens Kew
Tim is an expert in the plant family Myrsinaceae, and made a direct contribution to this project by helping identify Palau's allegedly single island endemic *Maesa canfieldiae* as a different species, native to New Guinea, that was introduced to Palau during WWII. Tim will also be reviewing other collections made during the project including the status of Palau's *Medusanthera* of which there has been uncertainty regarding if it is a Palau endemic or more widespread species

~ Dr. Michael Balick, Vice President, New York Botanical Garden
Michael Balick has been conducting research on the ethnobotany of Palau for several years in collaboration with the Belau National Museum. He visited Palau during our CEPF project, and invited us to contribute to his next book on the ethnobotany of Palau. Plans were made to include a chapter in this book on the folk taxonomy of Palau's endemic plants. This chapter includes new names in the Palauan language for plants that previously did not have vernacular names. This outcome in particular will have many benefits to the local community and enable locals to identify and conserve their endemic flora better.

~ Dr. David Lorence, Director of Science, National Tropical Botanic Gardens, Kauai
David Lorence, has helped with identification of plant collection in Micronesia for many years. He is also a Rubiaceae expert and will be helping delimit species boundaries for Palau's *Timonius* complex, including *Timonius salsedoi*, which is allegedly endemic to the tiny island of Malakal.

~ Professor Steve Darwin, Tulane University, New Orleans
Steve Darwin is a world expert on the genus *Timonius*, Rubiaceae, and has agreed to collaborate on a revision of Palau's *Timonius* species, which will be a subsequent outcome of the data and collections made during the CEPF project.

~ Dr. Art Whistler, adjunct professor for the University of Hawaii
Art has been collaborating with local researchers in Palau for several years now and continued to provide assistance with identifying collections throughout the duration of this CEPF project. He also provided helpful comments and advice during the IUCN submission process.

~ Professor Andrew Lowe, Department head and director, University of Adelaide
Andrew provided instrumental comments and direction for increasing the international profile of our CEPF project during the write up stage of the paper we published in the international scholarly journal *Biological Conservation* and continues to help promote this work in other outlets.

~ Dr. Wayne Law, Post Doctoral Research Fellow, New York Botanic Garden
During the CEPF project, Craig Costion and Ann Kitalong were invited by Wayne Law to be senior research personnel on an NSF proposal, which aims to survey unexplored areas of the interior of Babeldaob Island in Palau.

Planned Short-term Impacts - 1 to 3 years (as stated in the approved proposal): The report and accompanying data will increase local knowledge of Palau's endemic plants and enable many to be officially listed on the IUCN red list website. Palau's government and conservation authorities will have more knowledge to pursue future legislation for protecting endangered plant species and for the identification key biodiversity areas to be included into Palau's Protected Area Network (PAN legislation).

Actual Progress Toward Short-term Impacts at Completion:

Progress was obtained on the local knowledge of all species specified in the project proposal for specific inventory including 15 additional species. Furthermore we took bringing the results of science to the community to a new level by devising names in the Palauan language for all of Palau's endemic plants through consultation with local elders. IUCN submission was rejected on the first attempt due to our methodology extending beyond the 10 year or 3 generation time frame for data on habitat/population decline. Instead of seeing this as a setback we saw it as an opportunity and published our findings in *Biological Conservation* calling for the conservation community to consider long term declines of species not just declines in the short term. A second attempt of IUCN submission for Palau's endemic flora, using a methodology consistent with the IUCN Criteria framework, is now in review. The outcome of this assessment will ultimately affect legislation for threatened species in Palau. In either case, much progress was made during the coarse of the project in promoting the need to monitor threatened species, particularly Palau's endangered palm, *Ponapea palauensis*. It is now written up in the Koror state government strategic plan to support local research and conservation efforts of this threatened species.

Please provide the following information where relevant:

Hectares Protected:
Species Conserved:
Corridors Created:

Describe the success or challenges of the project toward achieving its short-term and long-term impact objectives.

Project Components

Project Components: *Please report on results by project component. Reporting should reference specific products/deliverables from the approved project design and other relevant information.*

Component 1 Planned: Achieve complete IUCN red-listing status for all sufficiently known endemic plant species (approximately 51 species).

Component 1 Actual at Completion:
The first IUCN submission attempt was rejected due to our methodology extending beyond the 100-year time frame for data on habitat/population decline. Instead of seeing this as a setback we saw it as an opportunity and published our findings in *Biological Conservation* (Attachment 1) calling for the conservation community to consider long term declines of species not just declines in the short term. A second attempt of IUCN submission for Palau's endemic flora (Attachment 2), using data that only recently became available with the completion of project collaborator Akiko Iida's thesis, is now in review. The data and methodology used in this second attempt is very rigorous and extensive and more importantly consistent with the IUCN Criteria framework and thus should be difficult for them to reject without a good justification.

Two separate IUCN assessments have been submitted to IUCN for *Parkia parvifoliola* and *Ponapea palauensis* for Endangered status using the results from the fieldwork from this project. These assessments are now in review.

Component 2 Planned: Reduce the data deficiency gap for Palau's endemic plant species by approximately 10%.

Component 2 Actual at Completion:
In 2009, 61% of Palau's endemic plants were considered "DD" data deficient (Costion et. al 2009) which is approximately 79 species. Subsequently the total number of endemic plants recognized increased from 130 to 135 (Costion and Lorence 2012) thus 51% of 135 = 69 therefore knowledge must be increased for a total of 10 species to achieve the proposed target. We aimed to do this through both targeted collections of poorly known taxa and through opportunistic findings while conducting the population inventories (Component 3). If our second IUCN submission attempt is accepted then we over-achieved this aim by far. Regardless of IUCN recognition we can confidently report back that knowledge on the distribution and/or abundance and/or species boundaries was increased for a total of 16 species as follows (all photographs, unless otherwise indicated, by Costion):

1. ***Selaginella palauensis*** Hosok. – This is a rare inconspicuous plant, known only from one mountain top locality on moist exposed basalt cliff. We recently distinguished this plant from two other recognized endemic *Selaginella* species in Palau by studying the type and comparing existing collections at BNM (photo of type specimen below). The other two species of Palau endemic *Selaginella, Selaginella dorsicola* and *Selaginella pseudo-volkensii,* may actually be only one valid species represented by two names. This will require follow up study by an expert in the genus.

(Type specimen of Selaginella palauensis; http://tai2.ntu.edu.tw/index.php)

2. ***Polyalthia merrillii*** Kaneh. – Fairly common, small to medium sized tree, occurring throughout the limestone Rock Islands – inland forest, not adjacent coast. Prior to this project, this species was only known from the type collection and had not been photographed before.

(*Polyalthia merrillii* in fruit)

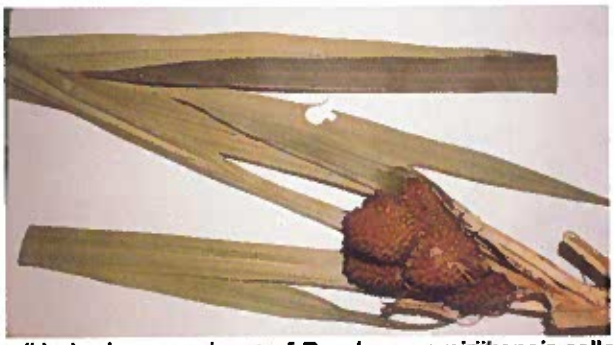
3. ***Ponapea palauensis*** Kaneh. – Very small range of occurrence – rare and scattered distribution within this area (See Figure 2, Attachment 3). During the project we were also able to photograph active pollinators on the flowers, an un-identified bee or wasp. Further work is required to identify the pollinator to species however, loss of pollinators or lack of cross pollination does not appear to be a problem for this threatened palm.

(*Ponapea palauensis* flower and immature fruits with pollinator)

4. ***Pandanus lorencei*** Huynh – This species is now believed to be a synonym of the widespread, non-endemic, *Pandanus tectorius* and is in line for subsequent revision.

(*Pandanus tectorius* growing in coastal strand forest)

5. *Pandanus palawensis* Martelli – This species is now believed to be a synonym of the Palau endemic *Pandanus aimiriikensis* Martelli, which may be restricted to volcanic islands, and is in line for subsequent revision.



(Herbarium specimen of *Pandanus aminiikensis* collected from Babeldaob)

6. *Pandanus pellliuensis* Kaneh. – This species was previously thought to be endemic to Peleliu but now may be the same species as *Pandanus aminiikensis*, due to recent genetic work now in progress. It is morphologically distinct from the volcanic island populations however and is thus under current investigation. This species was widespread and abundant on the island of Peleliu and throughout the limestone islands.

(Herbarium specimen of *Pandanus* sp. collected from Peleliu)

7. Rauvolfia insularis Markgr. – A new record of this rare species was discovered in one of the last remaining forested areas of Koror's volcanic islands. It is also known from a few localities with a very patchy distribution on the southeastern part of Babeldaob. Its occurrence on the remnant forest in Koror suggests it may have previously had a more widespread population.

(*Rauvolfia insularis* growing along the edge of forest in eastern Babeldaob)

8. Sterculia palauensis Kaneh. – This species occurs throughout the limestone islands of Palau but not in high numbers. It has been observed in the limestone islands of Airai down to the southern most Rock Islands, suggesting it is well distributed across the limestone islands. The trees can form medium to large sized buttresses.

(*Sterculia palauensis* in fruit, growing in coastal beach forest on the Rock Islands)

9. ***Anacolosa glochidiiformis*** Kaneh. & Hatus. – This medium to large tree species was photographed for the first time during the project, and is now represented in the BNM herbarium collection. Data is still lacking to determine its abundance but it is known to occur on both volcanic and limestone substrates in Palau so it may require a lower priority for conservation.

(*Anacolosa glochidiiformis* flower)

10. ***Ophiorrhiza palauensis*** Valeton – This species occurs commonly throughout the limestone islands and in wet areas of Babeldaob. It is a small semi-woody herb or small understory shrub.

11. *Timonius corymbosus* Valeton – This species occurs commonly throughout the limestone islands, particularly on the high inland karst ridges, but also occasionally along the coast.

(*Timonius corymbosus* flower, occurring on the Rock Islands.Photo credit: Ron Leidich)

12. *Timonius mollis* Valeton – This species is common throughout Babeldaob occurring in both forest and open savanna areas. It can occur as a short shrub in open savanna or tall, medium sized tree in closed forest. It is often confused with the closely related *Timonius subauritus* but can be distinguished by its much longer persistent calyx and often (though not consistent) more pubescent growth.

(Herbarium specimen of *Timonius mollis* collected from Babeldaob)

13. ***Timonius salsedoi*** Fosberg & Sachet – This species is now moved from "Critically Endangered" to "Data Deficient" until genetic studies can be done to confirm it is a valid species (See Component 3).

(Herbarium specimen of *Timonius* sp. collected from population on Malakal island)

14. ***Planchonella calcarea*** (Hosok.) P . Royen – This species occurs along the limestone bluffs throughout the rock islands and can be confused with the closely related *Pouteria obovata*. It is known only from few collections but appears to occur throughout the limestone islands.

(*Planchonella calcarea* collected from limestone bluff on the Rock Islands)

15. *Cayratia palauana* (Hosok.) Suesseng. – Collections of a *Cayratia* species matching the type of *Cayratia palauana* were made during the project. This species was previously only known to us from the type collection. It was only found at two sites in the Rock Islands, both disturbed sites, one an exposed site adjacent to a radio tower, the other an exposed area adjacent a tree-fall and cliff. It was also observed on Peleliu, which is all secondary recovering limestone forest with many breaks in the canopy. Efforts to get confirmation from an expert of the genus or family were unsuccessful. It will remain an endemic species for now, but due to its preference for disturbed sites (often an indicator of a recently introduced taxon) its taxonomic status may be revised in the future.

(Type specimen of *Cayratia palauana*, left, accessed online: http://tai2.ntu.edu.tw/index.php, and recent collection, right)

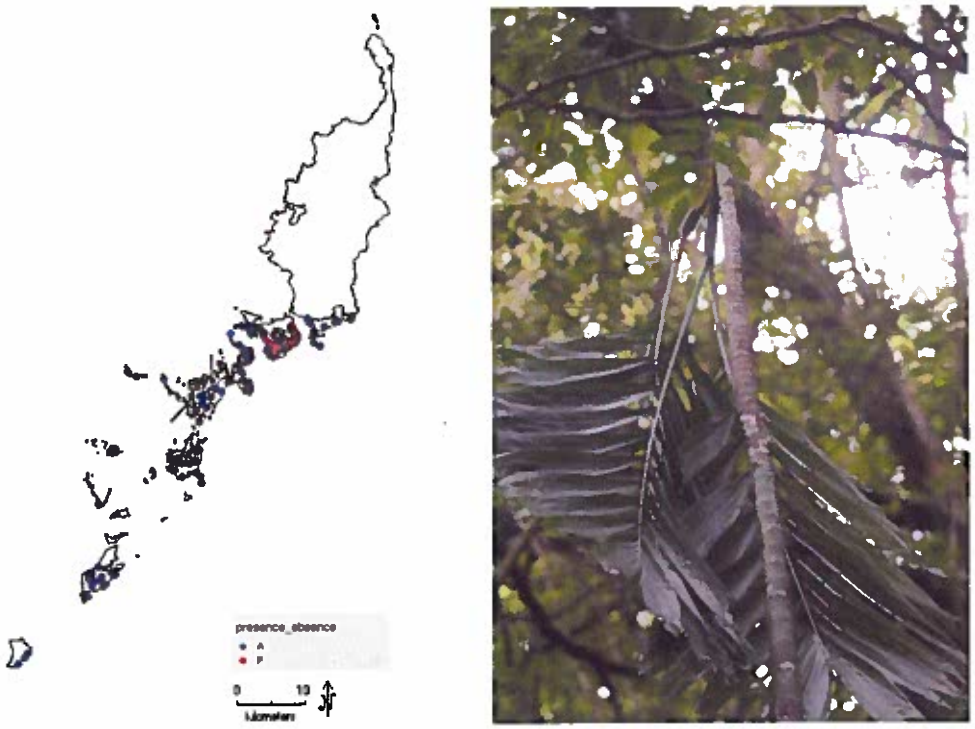
16. Medusanthera laxiflora (Miers) R. A. Howard – There has been previous uncertainty regarding whether this species is a Palau endemic under the name *Medusanthera caroliensis* (Kaneh.) Howard or if it belongs to the more widespread species *M. laxiflora*. Recent collections and photographs were made and sent away for expert identification. It is not endemic to Palau.

(Flower of *Medusanthera laxiflora*)

Component 3 Planned: Population size and relative abundance for four threatened plant species with small, restricted ranges is clarified and documented.

Component 3 Actual at Completion:

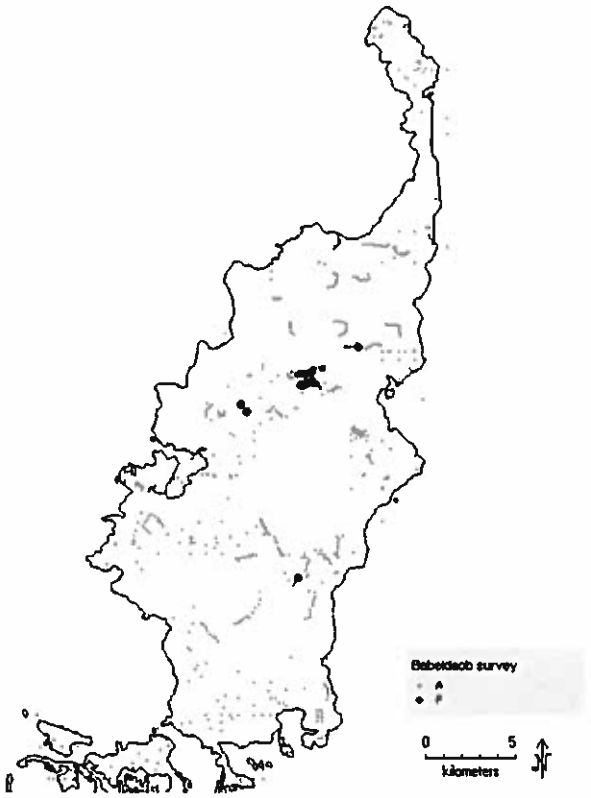
Ponapea palauensis – Prior to this project to complete distribution of this species was not known. We surveyed the entire range of potential habitat for this species across Palau's limestone islands and found it to have a very restricted distribution, 6.93 km^2 (Figure 1). Quantitative data was collected within the existing population and the total population size is estimated to be approximately 1,718 mature individuals. Our data qualifies this species for Critically Endangered status under IUCN Criterion B1,2(a,b(v)), Endangered status under IUCN Criterion C2a(ii), and Vulnerable status under IUCN Criterion D(2). A complete IUCN red list assessment (Attachment 3) was submitted for this species.



(Presence (red) and absence (blue) of *Ponapea palauensis*, photo (right) of damaged crown from invasive cockatoos that are causing the species to decline)

Parkia parvifoliola – (See attachment 4)

Population inventory for this species proceeded as planned. A population size estimate was conducted after collecting quantitative data from 39 transects within the central population. The maximum extent of occurrence of the central population was determined to be 4.1 km^2 however it is likely smaller. Although further fieldwork would be required to define the complete boundary of the population to calculate the exact total land area, with the existing data we are able to estimate a minimum (2,530) and maximum (4,927) number of total mature individuals. This data was used in combination with a synthesis of previous datasets for a separate IUCN assessment that nominates this species with Endangered status (Attachment 4).



(Total distribution of *Parkia* in Palau, primarily restricted to one population)

Recent concern was raised by Fortune-Hopkins (2009), world *Parkia* expert and monograph author (Fortune-Hopkins 1994), regarding the pollination biology of this species. Fortune noted that the flowers of *Parkia parvifotiola* are notably small for the genus and particularly too small to be pollinated by the only known nectar feeding bat in Palau, *Pteropus marianus pelewensis* (most species of *Parkia* throughout the range of the genus are pollinated by bats) and thus hypothesized that the loss of a former pollinator for this species (potentially an extinct smaller species of bat) may explain its rarity. This hypothesis inspired our proposed pollination study on this species. Visits to flowering trees were conducted over a two-week period from late afternoon to dusk. Multiple generalist pollinators were observed and photographed including a native bird and multiple species of insects. The Micronesian honey eater, *Myzomela rubratra*, was observed to routinely visit and feed on nectar from the flowers between tree to tree of this species from late afternoon to dusk. Multiple insects were also observed and photographed including the European honey bee, *Apis mellifera*. a species of blowfly *Chrysosomya* sp., and at least two other undetermined insects; potentially a flowerfly (Syrphidae), and a wasp or leaf cutter bee. This study effectively disproved Fortune's hypothesis (2009) that lack of a suitable pollinator may explain the rare distribution of *Parkia parvifoliola*. This species clearly has a generalist pollination

strategy. Loss of any alleged former pollinators has not affected cross-pollination of this species as it is being pollinated by multiple species including both native species and a recent introduction, the European honey-bee. Thus the pollination biology does not explain the rarity of this taxon. A more plausible explanation is likely to be the fact that the seeds are enclosed in a dried legume pod instead of a fleshy fruit, which is more likely to be dispersed by birds and bats. It is possible that this species relies entirely on dispersal by gravity, which would explain its small distribution and slow recovery rate from alleged historic timber harvesting.

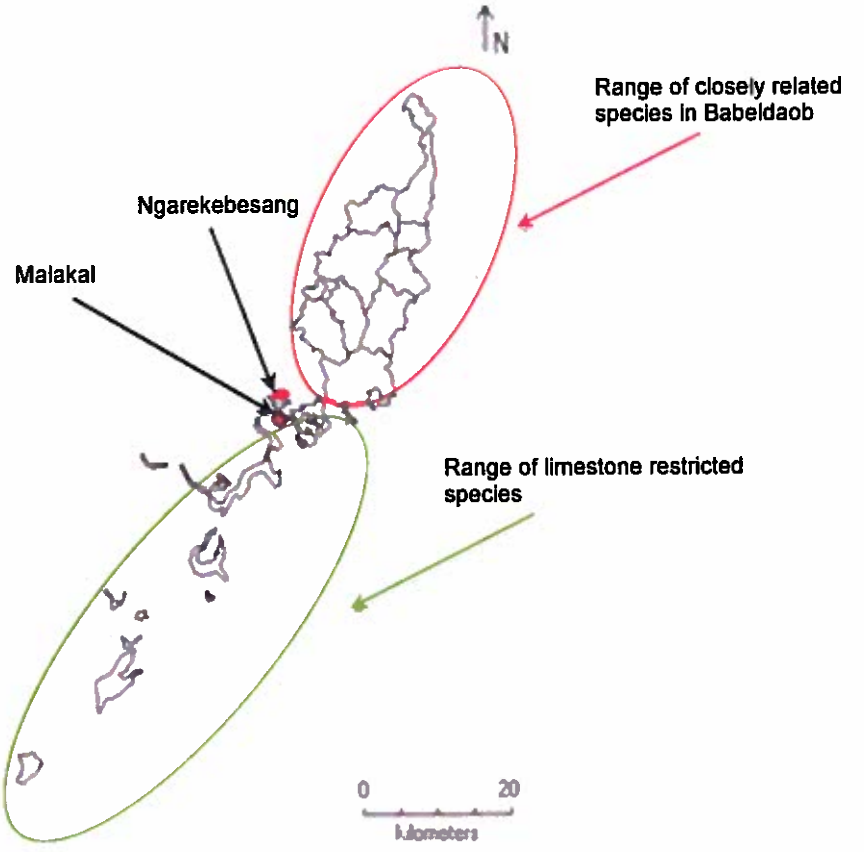
(*Myzomela rubratra* visiting *Parkia* flowers at dusk)

(*Myzomela rubratra* feeding on nectar from *Parkia* flowers)

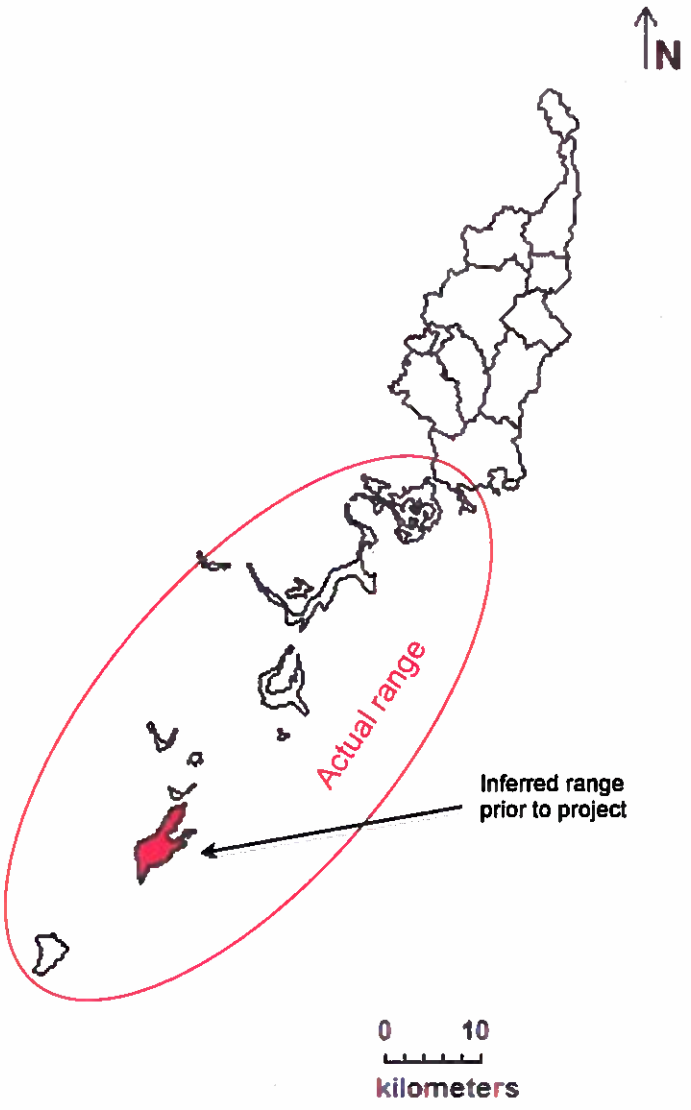
(The European honeybee visiting *Parkia* flowers)

(Undetermined species of flies visiting *Parkia* flowers

Timonius salsedoi: Population survey of this species proved to be challenging with clear identification of it as a distinct species from its close relatives *T. mollis* and *T. subauritus* very difficult in the field. This alleged species is part of a species complex and occurs in the convergence zone between species endemic to Babeldaob and species endemic to the limestone islands. We surveyed the island of Malakal extensively and sampled from several *Timonius* sp. plants present. A population of *Timonius* sp. that appears to match the description of *Timonius salsedoi* was also found in the only other area of extant forest on Koror's volcanic islands, the island of Ngerekebesang. Genetic analysis and further morphological study of these samples are required to determine if the populations in Koror are distinct from the abundant populations in Babeldaob. David Lorence (NTBG) and Steve Darwin (Tulane University) have agreed to collaborate on this project, but we have yet to identify funding for the genetic work. This species by necessity must be down-listed from "Critically Endangered" status to "Data Deficient" until further information is available.

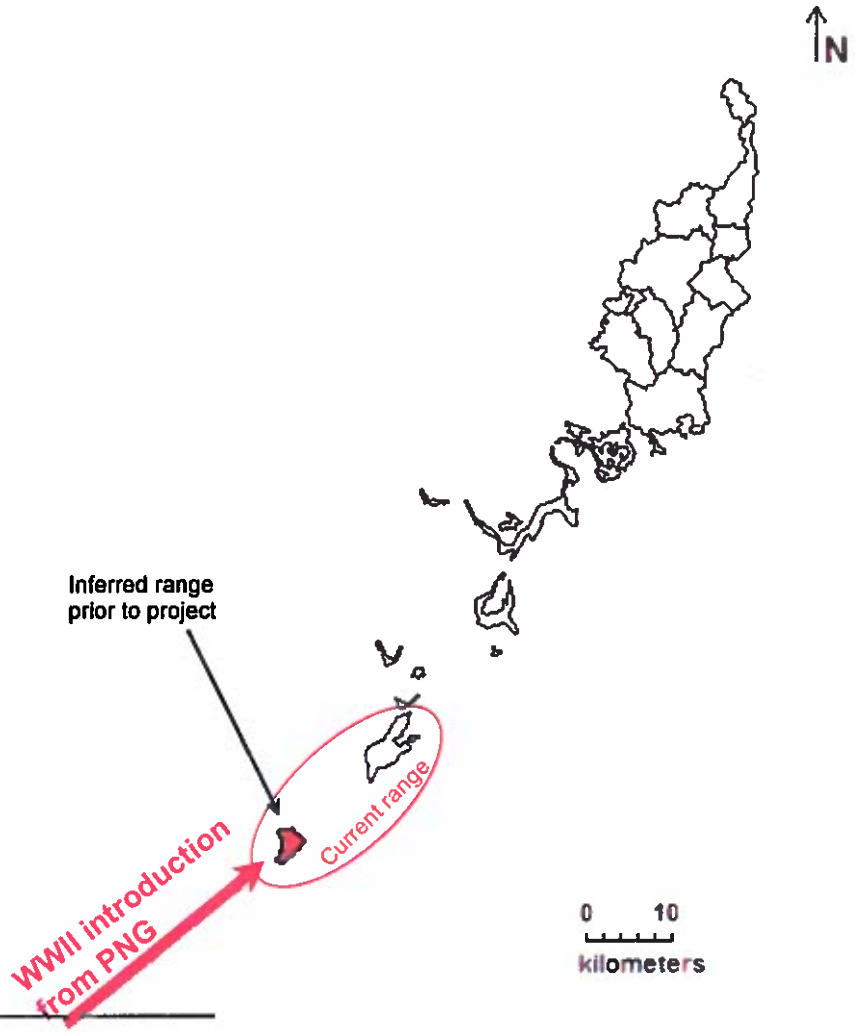


Pandanus peleliuensis: This species is now believed to occur throughout the limestone rock islands. Quantitative data was collected on this species across the island of Peleliu but analysis of this data is postponed until confirmation of its taxonomic status is complete. Timothy Gallaher, from the University of Hawaii, is conducting genetic work to delimit species boundaries within the genus *Pandanus* on Palau. The results of this work will contribute towards a revision of the genus for Micronesia. Preliminary lab results place this species very close to *Pandanus amiriikensis*. There are two base pair differences distinguishing the two. We are not yet sure if there should be two species but for now, based on field observations from the survey, the species is definitely not endemic to the island of Peleliu. It either occurs abundantly throughout the limestone islands of Palau, or is a synonym of *Pandanus amiriikensis*, which occurs on Babeldaob, and thus should be down-listed for high conservation priority.



Maesa canfieldiae: This species is now determined to be *Maesa tetrandra*, which is native to New Guinea and was likely introduced to the island of Angaur during the movement of military equipment from PNG to Palau during WWII. Additional records of this species were collected on the island of Peleliu during the project, suggesting that it is spreading north. Its occurrence only adjacent the airport in Peleliu and similarly its occurrence only in disturbed areas on the island of Angaur raised the initial doubt to it being a valid endemic species. The updated taxonomy will be published in a peer- reviewed journal in collaboration with Dr. Tim Utteridge from the Royal Botanic Gardens, Kew.

(Herbarium specimen of *Maesa tetrandra* collected from Angaur, previously determined as *M. canfieldiae*)



Component 4 Planned: A long-term strategy is developed with local stakeholders to address the data deficiency gap for all remaining endemic plants in Palau.

Component 4 Actual at Completion:
We hosted a series of meetings and a full day symposium of which numerous participants attended (See Attachment 5). Several representatives from different local agencies gave presentations on existing datasets on biodiversity data in Palau. It became clear that there are many datasets and networks of plots from different types of inventories that have been done, most unpublished. It was decided that the best next step is to consolidate all of these different inventory datasets into one database of presence-absence data. Also a list of "DD" taxa is to be distributed with information on identification tips to subsequent visiting researchers and inventory efforts. This was determined to be the most appropriate plan given the scale of conducting nation wide inventories for species that have been elusive to experts and the lack of trained botanists on island. A small grant will be sought out to fund the synthesis of a small report that consolidates all available information on the pending "DD" endemic plant species. This will then be distributed for use in subsequent field studies in Palau.

Component 5 Planned: A national database of all historic plant collection records from Palau is updated to enable species distribution mapping and prioritization of poorly collected localities.

Component 5 Actual at Completion:

Prior to conducting the field work for this project we were contacted by Michael Thomas from the University of Hawaii, who informed us of his NSF funded project to database and scan all herbarium specimens held in herbariums across the Pacific. This initiative was clearly consistent with our CEPF project Component 5 and went way beyond achieving our initial aim. Michael visited the Belau National Museum during our fieldwork and he completed scanning half of the BNM collection. We used our funds to support the labor to get these specimens data based and processed and then re-organised and curated in the herbarium to better facilitate completion on his next visit. When this project is complete, all of Palau's herbarium specimens will be publically available through the www.pacificherbaria.org. All the data entry is standardized and will enable efficient and accurate mapping of all collection records per species. We also trained BNM staff in the use of free GIS programs for mapping species from point locality data.

A total of 214 collections (Attachment 6) were made throughout the course of the fieldwork and at least one duplicate of each was accessed by BNM. Duplicates were also sent to the National Tropical Botanic Gardens, Kauai, The New York Botanic Garden, The Royal Botanic Gardens Kew, Tulane University, The University of Hawaii, and the Australian Tropical Herbarium. Many of the collections made were previously absent from the BNM collection.
These collections and ongoing collecting activities provide valuable data on the distribution of Palau's species.

Were any components unrealized? If so, how has this affected the overall impact of the project?

For Component 1, yes and no. Initially our attempt to get all endemic plants (for which sufficient data is available) IUCN listed failed but shortly before the end of our project a new dataset became available that overcame the data limitations we had initially. Our second attempt will still be in review by IUCN at the time of submitting this report.

For Component 3, one of the four species, *Timonius salsedoi*, by necessity must be left unresolved until further genetic work can be done. The project however enabled thorough collection of samples that will allow this work to be done sufficiently. The species *Pandanus peleliuensis* is also pending some lab results from genetic work in progress however – these

results should provide an outcome fairly soon. Based on the morphology, we feel confident that this species is not endemic to the island of Peleliu and is abundant across the limestone islands, thus the primary objective is complete. Given that we surveyed five instead of four species (as was planned in proposal) and only one is left unresolved, Component 2 is for the most part fully realized.

For Component 4, we hoped to see more local initiative to identify a specific funding source and initiate a grant proposal but this will happen on its own time. The stage is set for making it happen in any case, which was what we committed to do.

Please describe and submit (electronically if possible) any tools, products, or methodologies that resulted from this project or contributed to the results.

Attachment 1: ***(BioConsv_2012.pdf)*** Published paper, which was developed from rationale of our first IUCN submission attempt:

Costion, C., J. Liston, A. H. Kitalong, A. Ida, and A. J. Lowe. 2012. Using the ancient past for establishing current threat in poorly inventoried regions. *Biological Conservation* 147:153-162.

Attachment 2: ***(IUCN Assess_Palau plants.pdf)*** Second IUCN assessment submission, derived from data from Akiko Iida's doctoral dissertation.

NOTE – This attachment contains unpublished results and cannot be publically distributed or uploaded to the CEPF website without direct permission from the authors.

Attachment 3: ***(Datasheet for Ponapea_CC_WE.pdf)*** Complete IUCN assessment for *Ponapea palauensis*

NOTE – This attachment contains data and figures in review for publication in a peer-reviewed journal and cannot be publically distributed or uploaded to the CEPF website without permission from the authors.

Attachment 4: ***(Datasheet for Parkia.pdf)*** Complete IUCN assessment for *Parkia parvifoliola*

Attachment 5: ***(meeting_forest health.pdf)*** Hosted meeting and symposium agenda, notes, and list of participants

Attachment 6: ***(herbarium collections.xlsx)*** List of herbarium specimens collected during the project

Attachment 7: ***(Palauan names manuscript.pdf)*** The folk taxonomy of Palau – A list of new and existing names for Palau's endemic plants in Palauan.

NOTE – This attachment is a complete manuscript that has been submitted for publication and cannot be distributed or uploaded, in whole or part, to the CEPF website without permission from the authors.

Lessons Learned

Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider lessons that

would inform projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community.

A big lesson that is relevant to the conservation of all species that are poorly known is that prior to assuming a population inventory is necessary to obtain a more accurate threat assessment, some species simply need to be verified taxonomically. That is to say, to verify that they are valid species to begin with. In this case, we had to actually go there to realize this so it worked out in the end, but time could be saved in the planning stage – e.g. planning for a population survey for abundance data is much more work then collecting a few samples and photos to send away for verification.

Another major lesson was realizing the amount of time and work that goes into an IUCN assessment for a species. This is a substantial undertaking and often very difficult for species that have not been studied very much, in places like Palau. We ultimately found a way around this data limitation by coming up with a biome wide approach that applied to a group of species that were all restricted to a specific habitat type and then used data on the decline of that habitat since data on decline in species populations simply did not exist.

Project Design Process: (aspects of the project design that contributed to its success/shortcomings)

I think one aspect that contributed to this projects success was focusing on taking a close look at a few poorly known species – while simultaneously aiming to progress knowledge on a broader scale. Biodiversity surveys always turn up unexpected results, so in this case the design worked out very well. During the population inventory of specific species we were able to remove several other species off the "data deficient" category simply because we covered enough ground to become familiar with the distribution of other taxa as well.

I think we were a bit ambitious to aim at getting so many species successfully listed on the IUCN red-list – but in the end, our effort to over-come the data limitations resulted in some great international collaborations across academic disciplines with a good published result. The relationships that this collaboration fostered enabled us access to a better dataset that we now think surmounted the original problem.

Given the nature of grants, often being that you don't actually get the money for quite some time after the application process, it really helped to plan for a short period of intensive work, spread out over a couple years. As the project leader, I had to decide on when to commence the fieldwork. By delaying the fieldwork till my schedule was free, I was able stay much longer without pressing obligations to distract me and achieve much more than we set out to do. This worked really well in the end.

Project Implementation: (aspects of the project execution that contributed to its success/shortcomings)

For expedition type projects that are based on inventory or collection data but also aim to make conservation progress, it really helped to be able to stay in the community for an extended period of time, rather than just going in, getting the data, and leaving. This establishes, or in my case rejuvenated relationships, that are instrumental in the long-term nature of conservation work. It also enabled us to go beyond the project aims in many cases.

Other lessons learned relevant to conservation community:

Additional Funding

Provide details of any additional funding that supported this project and any funding secured for the project, organization, or the region, as a result of the CEPF investment in this project.

Donor	Type of Funding*	Amount	Notes
University of Adelaide University of Ade			

Additional funding should be reported using the following categories:

- ***A*** *Project co-financing (Other donors or your organization contribute to the direct costs of this project)*
- ***B*** *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF funded project.)*
- ***C*** *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

Sustainability/Replicability

Summarize the success or challenge in achieving planned sustainability or replicability of project components or results.

The nature of the species specific inventory work – may not always require follow up work, however continued effort towards progressing knowledge on Palau's endemic flora would be the sustainability goal. Since this project was closely allied with the Belau National Museum sustainability was achieved. BNM will continue to receive support from other sources to expand their collections, database, and knowledge of Palau's flora.

Summarize any unplanned sustainability or replicability achieved.

One of the most interesting unplanned outcomes of this project was the list of Palauan names for Palau's endemic plants (Attachment 7). Prior to the project very few of Palau's endemic plant species had vernacular names. We felt that ensuring that each taxon had a local name was crucial to engaging the community in the long-term goals of our work. We spent a few weeks sitting with a few knowledgeable Palauan elders and showed them all the information we had about each species, and let them come up with names for each one in the Palauan language. Although at the time of report submission, this manuscript is still in review, we feel in the long run this may be one of the most influential outcomes of the project. Without a local name it is hard for people to relate to the need to conserving something they don't know anything about, but once a species has a Palauan name, people will relate to it immediately and want to know more about it. This side-project was not part of our initial short-term objectives, but we thought the potential long- term community impact made it worthwhile.

Safeguard Policy Assessment

Provide a summary of the implementation of any required action toward the environmental and social safeguard policies within the project.

Additional Comments/Recommendations

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

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*****If your grant has an end date other than JUNE 30, please complete the tables on the following pages*****