CEPF Final Project Completion Report

Instructions to grantees: please complete all fields, and respond to all questions, below.

Organization Legal Name	The New York Botanical Garden
Project Title	*Plants and People: Baseline Floristic and Ethnobotanical Surveys in Tafea Province, Vanuatu*
CEPF GEM No.	64251
Date of Report	February 15, 2017

CEPF Hotspot: East Melanesian Islands

Strategic Direction: Strategic Direction 1: Empower local communities to protect and manage globally significant biodiversity at Key Biodiversity Areas under-served by current conservation efforts.

Grant Amount: $156,849 (includes supplements)

Project Dates: July 1, 2014 – December 31, 2016

1. Implementation Partners for this Project *(list each partner and explain how they were involved in the project)*

The New York Botanical Garden: Partner that coordinated logistics and training; participated in field studies, research, publication, outreach and dissemination of information and results; and had fiscal responsibility for the program.

Vanuatu Department of Forestry: Partner that coordinated national logistics and permitting issues; facilitated and participated in field studies and collection of biodiversity data; and implemented national outreach activities.

Tafea Kaljoral Senta: Partner that coordinated local logistics and community interaction on Tanna and Aneityum; participated in field studies and collection of ethnobotanical and linguistic data; and prepared outreach materials.

University of the South Pacific: Partner that participated in field studies (especially establishment of permanent vegetation transects), and coordinated student training.

National Herbarium of Vanuatu: Partner that participated in field studies; and coordinated preparation, preservation, curation, and databasing of biodiversity collections.

Conservation Impacts

2. Describe how your project has contributed to the implementation of the CEPF investment strategy set out in the ecosystem profile

CEPF STRATEGIC DIRECTION 1: Empower local communities to protect and manage globally significant biodiversity at priority Key Biodiversity Areas under-served by current conservation efforts.

1.1 Conduct baseline surveys of priority sites that build government-civil society partnerships and bridge political boundaries

- Implemented base-line surveys of plant diversity (through general collecting) and characterization of vegetation (through ecological transects) in partnership with Vanuatu Forestry, the Tafea Kaljoral Senta, the University of the South Pacific, and 23 local communities in Tanna (including Green Hill) and Aneityum.

1.2 Raise awareness about the values of biodiversity and the nature of threats and drivers among local communities at priority sites

- Conducted formal awareness presentations to leadership groups throughout Tanna and Aneityum, to discuss the relevance of the project goals relating to biodiversity and conservation, and the threat that loss of traditional knowledge (of indigenous plant names and uses) poses to environmental and social sustainability and resilience; these same meetings were also used to elicit local priorities to ensure that the project was serving local needs, to the extent possible;
- Held regular and frequent community meetings ("smol toktok") in all villages where the project team worked to discuss the relevance of project activities to overall conservation goals;
- Conducted presentations describing project goals and progress to communities, school groups, and the general public to raise awareness of the values of and threats to biodiversity;
- Produced and distributed regular "Trip Reports" after each expedition to provide feedback and to demonstrate tangible progress to project participants at all levels; these reports also stressed the importance of partnerships with each group of stakeholders through photographs and text documenting their involvement;
- Leveraged the CEPF-funded project with complementary efforts designed to promote importance of biodiversity among the general public, including Vanuatu Forestry activities for reforestation efforts, FAO-sponsored activities to establish sustainable protected areas, and national events such as the International Day of Forests.

1.3 Support local communities to design and implement locally relevant conservation actions that respond to major threats at priority sites

AND

1.4 Demonstrate conservation incentives (ecotourism, payments for ecosystem services, conservation agreements, etc.) at priority sites

- The project team has identified links between global climate change and associated severe-weather events (such as Cyclone Pam) with increased levels of deforestation and major threats to biodiversity in Tanna and Aneityum. During the course of the project, the team developed actions and incentives to assist local communities to preserve forests and associated ecosystem services (such as clean-water sources) through the establishment of watershed conservation and water-distribution systems that are tied directly to forest conservation and maintenance of watershed habitats. The project team has initiated (but not completed) discussions and actions to establish additional formally protected areas in the priority sites, but additional time is needed to complete these efforts.

3. Summarize the overall results/impact of your project

The project team completed the first three years of a 10-year project to document the plant biodiversity of Tafea Province; work with local communities to record information on plant utilization and management; identify priority plant species not currently listed deserving of protection; identify forest areas with a high degree of plant diversity; through establishment of transects, monitor dynamics of these forest areas in the face of global climate change and catastrophic weather events; address infrastructure deficiencies (both human and material resources) at the national level relating to the Department of Forestry and National Herbarium; and, very importantly, train a group of local young men and women to be the next generation of biodiversity specialists in Vanuatu.

Planned Long-term Impacts - 3+ years (as stated in the approved proposal)
List each long-term impact from Grant Writer proposal

Long-term impacts listed below (under #4), together with discussion of progress.

4. Actual progress toward long-term impacts at completion

- *Long-term Impact 1: Complete baseline surveys of plant diversity, focusing on species of conservation and economic importance in collaboration with local partners, with special focus on priority sites in the Tafea Province: Aneityum, Futuna, and Green Hill, Tanna.*

  Through the project's fieldwork thus far, nearly 1,580 plant specimens have been collected (typically in duplicate sets of six), along with preliminary linguistic data and information on traditional use, where available. In addition, digital images have been taken of each specimen collected in the field. A complete set of plant specimens has been deposited at the National Herbarium of Vanuatu (PVNH), with duplicates to be distributed to other important regional/international herbaria.

  Ten long-term ecological monitoring plots have been established and surveyed, eight in Tanna, established before Cyclone Pam (March 2015) and re-surveyed eight months after the storm to begin to understand the process of ecosystem regeneration and forest resilience. Two transects have been established and surveyed in Aneityum. All of these transects provide a mechanism to track changes to forests in response to climate change.

Remotely from New York, the research team compiled data from historical collections at herbaria with important holdings for Vanuatu. A preliminary database project was initiated, capturing data for over 6,000 new and historical specimens and 400 literature citations. The project cleaned and compiled specimen records available from herbaria of The New York Botanical Garden, Missouri Botanical Garden, United States National Herbarium, Bishop Museum (Herbarium Pacificum), National Tropical Botanical Garden, Royal Botanical Gardens, Kew, Paris Museum (Muséum National d'Histoire Naturelle), and National Museum of Nature and Science (Japan). Together with the project's field collections, this combined resource acts as a solid platform for compiling annotated checklists and as a portal for accessing related data, including photographs of specimens in the field, species distribution maps, conservation assessments, a linguistic dictionary of indigenous botanical knowledge, and taxonomic literature.

- *Long-term Impact 2: Build local capacity for biodiversity, taxonomic, ethnobiological, and ethnomedical research among key governmental agencies as well as scientific, cultural, and community-based institutions in Vanuatu, focusing on priority sites in the Tafea Province.*

  The project has actively engaged local personnel to participate in all of the field expeditions, including staff from government agencies and community-based organizations, such as the South Pacific Regional Herbarium, Vanuatu National Herbarium, and Tafea Kaljoral Senta, as well as many community leaders and villagers. During this grant period, eight expeditions were undertaken over a three-year period, involving researchers from NYBG, the University of Hawaii, the University of the South Pacific, the Vanuatu National Herbarium, and the Tafea Kaljoral Senta, and providing many opportunities for local training and capacity building.

  The need to train a new generation of biodiversity scientists in Vanuatu is urgent. If this next generation of scientists is to be successful, they must be fully integrated with regional and international institutions having expertise in Pacific botany, including the institutions collaborating in this project. In consultation with the Department of Forestry, the project has selected two students, Frazer Alo and Thomas Doro, students at the Emalus Campus of the University of the South Pacific (USP) in Port Vila. In addition, the project team has identified two other students (Kimson Perie and Stephanie Sali) to work on the project. All four students have been involved with training in processing herbarium collections, herbarium management, and intensive field studies (over periods of time typically lasting several weeks to one month).

  The project team improved curation and use of the National Herbarium of Vanuatu, through collaboration and training with local staff and supplying urgently needed supplies and equipment. For example, a new specimen dryer was constructed and an existing space (in bad disrepair) was rehabilitated and repurposed for use as a specimen processing facility, which now includes state-of-the-art equipment and a clean, secure area with sorting tables and shelving for storage of collecting and processing equipment and supplies. These enhancements will help expedite specimen processing for all future work involving the National Herbarium, improving capacity not only for the CEPF project, but for a whole host of other projects as well. The project team trained staff and students in best practices for processing the formal exchange of scientific specimens among international institutions, including shipment of rare and threatened

species (regulated by CITES), and noxious weeds and parasites. The project has continually provided training lectures and practica in various topics in biodiversity and botany to the staff and students.

- *Long-term Impact 3: Establish effective collaborative relationships between local institutions and regional and institutional scientific and conservation organizations to facilitate local and regional research, conservation, and sustainable resource management.*

  A Memorandum of Understanding (MOU) was signed between NYBG and the Vanuatu Department of Forestry. In addition, a 10-year Research Permit (including for plant collecting and documentation of cultural information) was granted to the project by the Department of Environmental Protection and Conservation, the Department of Forestry, and the Vanuatu Cultural Centre. The team continually held discussions with national and local stakeholders (e.g., members of parliament, councils of chiefs, local forestry field workers, women's groups, youth groups, pastors' organizations, and primary health care workers) to inform them of project activities and to receive feedback from them about ongoing endeavors. The project worked collaboratively with many of these groups since the start of the fieldwork, continuing through to the present.

- *Long-term Impact 4: Disseminate the findings and outcomes of this research locally, regionally, and internationally through methods and media appropriate for constituencies ranging from local communities (using locally relevant media and messaging) to international scientific organizations (including through peer-reviewed journals and the Internet).*

  Botanical data generated through this project have been publicly disseminated to a wide audience through the Vanuaflora website, which includes a searchable specimen database, field images, and distribution maps. The project's long-term goal is to produce a published, specimen-based checklist that can be widely distributed to remote areas in Tafea Province and beyond.

  The team used a variety of approaches to disseminate findings and outcomes of the research to many different stakeholders. Extensive trip reports, prepared after each expedition, provided trip narratives and descriptions of the collections and interviews made. These reports were widely distributed (to local communities, hospitals and medical aidposts, schools, and government agencies), and documented the information collected, serving as the basis for extensive conversations aimed at improving the quality of the information collected, as well as a tool to inform other communities about the benefits of joining the project. Moreover, through the addition of linguist Dr. David Harrison, an outreach component was initiated to help preserve the local languages through production of a plant dictionary, starting with Aneityum Island and recently expanded to southern Tanna. Throughout the grant period, the team distributed outreach materials to raise public awareness of the project.

  Presentations were regularly provided to local stakeholders, especially through schools and community groups. A formal scientific presentation was presented to an

international conference (August 2016) held in Savannah, Georgia, U.S., and the project also presented a seminar in Port-Vila through a lecture series sponsored by Vanuatu Environmental Science Society (VESS), focusing on the goals and accomplishments of the project, provided to a large cross-section of the population in Port-Vila, including USP students, ex-pats, local people, and NGO leaders.

- *Long-term Impact 5: Apply results of biodiversity, ethnobiological, and ethnomedical research and disseminate the replicable programmatic model for implementation of programs in science-based biodiversity conservation, environmental policy, sustainable development/resource management, and improved health care in Tafea province, and more widely in Vanuatu and Pacific Islands.*

  Island floras (and peoples) have evolved with their environments, and have proved to be resilient to catastrophic events such as volcanoes, earthquakes, and cyclones. But cumulative impacts in places like Vanuatu are making them increasingly vulnerable to the imminent effects of global climate change. Among these pressures are increased destruction and fragmentation of natural habitats such as forests, expansion of invasive species, changing lifestyles and economic situations (subsistence farming to consumer-style cash economies), and greater frequency of severe-weather and El Niño events.

  To assist communities in the sustainable use of their natural resources and to increase their environmental and social resilience in the face of such global threats, the project has assessed the use of these resources through (1) extensive literature and database review from existing sources, (2) extensive field studies of plant biodiversity, and (3) ethnobotanical interviews on Tanna and Aneityum. This substantial progress represents the first three years of a long-term, ten-year project that will be implemented throughout Tafea Province, a region thought to contain half of Vanuatu's plant diversity.

  While conducting the project's field studies, many of the communities that the team visited spontaneously expressed the need for conservation initiatives. They described how the natural environment and native plants are valued as sources for subsistence, economic uses, and cultural uses. Several communities expressed the desire to set up "community-organized conservation areas," a theme that emerged frequently during the trips, especially in areas that relate to maintaining ecosystem services (such as protecting watersheds and ensuring the availability of clean water). These conservation areas are also valued by communities as biocultural diversity reserves, places for village elders to educate community members and children towards the agreed upon goal of preserving traditional cultural, ecological, and botanical knowledge for future generations, and their use for ecological and community resilience.

  In the midst of the project, Super-cyclone Pam, a category-5 tropical storm, made a direct hit (March 13-14, 2015) across all of Tafea Province. The project team was present on Tanna Island, and observed first-hand the impacts of this catastrophic event as well as the resilience and character of the Ni-Vanuatu in responding to it. In the days leading up to the storm, the project team was presenting talks to the community where they were based about the need for keeping some of the traditional ways in practice that once ensured a greater degree of self-reliance, such as building cyclone houses with

a triangular design and held together with vines that would maintain flexibility against the wind, rather than nails that pull out. Other discussions involved the need to continue to practice traditional food preservation methods, such as with bananas, which can be prepared in a way that ensures their edibility for at least six months. The project team, collaborators, and villagers were astonished at how timely these talks were, in view of the devastating effects of this storm on communities and the environment, making the project's work even more urgent. Given the prognosis of more frequent catastrophic weather events in the region due to climate change, it will be important to monitor and support environmental and community recovery, adaptation, and resiliency.

The project has been providing baseline data to communities in Tafea Province. Because field studies are always conducted with the permission and extensive participation of local communities, the project's studies in North, Southeast, and Southwest Tanna and in Aneityum have demonstrated intense local interest in preserving their forests, particularly in relation to valued ecosystem services (especially clean water) and natural resource management for food, hunting grounds, building materials, and cultural uses. The project's partnership with members of the Vanuatu Department of Forestry has been facilitating national recognition of these community-based conservation areas. Through a series of community meetings, presentations on data from the project have been helping to raise awareness of the need for conserving natural habitats, as well as providing information for guiding the selection and demarcation of priority areas that capture the greatest amount of overall biodiversity, taking into account ecosystem and species diversity, and the presence of endemic or threatened species.

The project team has been working on preliminary floristic surveys of Tanna and Aneityum during six expeditions (June 2014, November 2014, March 2015, November-December 2015, April-May 2016, and December 2016), and completed a total of 10 permanent monitoring plots at five distinct sites (North, Southwest, and Southeast Tanna, plus Southeast and Southwest Aneityum). In Tanna, these surveys were completed before Cyclone Pam, and provided baseline data of the condition of pristine and human-impacted forests before the storm. Through emergency funding ($22,310) provided by the National Geographic Society, the project team was able to complete re-surveys of the eight Tanna transects to characterize post-cyclone forest recovery and to begin to understand how Pacific Island forests react to catastrophic environmental events.

During a trip in August 2015, the team consulted with local partners in Tanna to assess post-cyclone needs, and the following theme emerged: the need to set aside some portion of the communities' forests to help preserve ecosystem services, especially clean water. A plan to set aside intact forested areas (mostly located away from settlements) as source areas for clean water and conservation of natural habitats was discussed. As a result of those discussions, the team submitted a supplemental request to enhance conservation infrastructure, and in October 2015, CEPF generously agreed to provide the supplement. In earlier periods, the team completed surveys of water needs, determined water sources and flow, and assessed equipment needs for water distribution, and then delivered the systems and tools needed in post-cyclone recovery.

During the most recent trips, after completion of the water systems, the project team was invited to attend formal "opening ceremonies," during which chiefs and local leaders discussed the importance of forest conservation to ensure a sustainable water supply now and into the future. As a result of this project component, over 1,000 people spread over nine villages now have daily access to clean water for the first time.

Ethnobotanical surveys have also contributed many examples of solutions for community adaptation and resiliency in the face of climate and global change. In relationship to the project's objective to improve health care in Tafea, useful local plants, including plants used in traditional medicine where sufficient evidence of efficacy and safety exists, have been identified by the project and will be used in preparing ethnobotanical publications and localized primary health care manuals.

Many communities, such as the Nusemetu Conservation Area (= the Green Hill KBA) in North Tanna, also place a high value on rare plant species, such as *Caryota ophiopellis* and the critically endangered *Carpoxylon macrocarpum* (of which there are only ~40 plants left in natural settings), particularly because of their cultural significance and traditional uses. Some communities are working toward establishing programs of both *in situ* and *ex situ* conservation of such species. As the project's field surveys and botanical studies progress, the team expects to identify additional rare species that are important to both the environment and the communities.

To advance the objective of integrating biocultural conservation with primary health care, meetings were held with the Vanuatu Ministry of Health, Tafea Provincial Health, Lenekal Hospital, and community members to address concerns about health care and preservation of traditional knowledge of medicinal plants. Health care providers expressed the need to improve primary health care delivery, and continue to address infectious diseases, as well as non-communicable diseases that result from lifestyle choices, such as hypertension and diabetes. The project team presented health care leaders with copies of the Palau Primary Health Care Manual, which serves as a potential model for the type of work that will be completed in Tafea. There was great enthusiasm for the prospect of a similar manual focused on Tafea Province for use in helping to improve the provision of primary health care in Vanuatu, and the suggestion was made to also produce smaller, more locally focused booklets on medicinal plants, to be disseminated and used on a more immediate basis until a full primary health care manual can be completed and made available.

The project's partnership with members of the Vanuatu Department of Forestry has facilitated national recognition of our efforts to begin community-based conservation areas, although it must be understood that this is an extremely slow, cumbersome, and bureaucratic process. Through a series of community meetings, presentations on data from the project has helped to raise awareness of the need for conserving natural habitats, and provided information for guiding the selection and demarcation of priority areas that capture the greatest amount of overall biodiversity, taking into account ecosystem and species diversity, and the presence of endemic or threatened species. As the long-term project continues, the project team is finding that local partners intuitively understand the connections between preserving their culture, improving their health, conserving their biodiversity, and protecting their forests.

- *Long-term Impact 6: Comply with CEPF Social Safeguard Policies related to activities in areas with Indigenous Peoples. Monitor according to policy and report periodically to CEPF.*

  The project has complied with all CEPF Social Safeguard Policies.

Planned Short-term Impacts - 1 to 3 years (as stated in the approved proposal)
List each short-term impact from Grant Writer proposal

Short-term impacts listed below (under #5), together with discussion of progress.

5. Actual progress toward short-term impacts at completion

- *Short-term Impact 1: Continue to build strong partnerships with local researchers, relevant government agencies, universities and other educational institutions, conservation organizations, cultural institutions, health care organization and providers, traditional leaders, and community organizations.*

  Drs. Balick and Plunkett have a long history of working with a diverse group of plant scientists, ethnobotanists, mycologists, cultural specialists, and linguists to study and conserve plants, fungi, ethnobotanical and ethnomedical knowledge, cultural practices, and plant-related language information of Pacific islands. In Vanuatu, they have been working most closely with the Department of Forestry and its National Herbarium, providing training in the field, and training workshops in Port Vila for several forestry officers and four forestry students. The project has also sponsored two of the same students for university-level training at the University of the South Pacific. Significant improvement of the Herbarium has also been achieved through enhanced facilities and curation, but more remains to be accomplished. This is especially important because natural history collections are the foundation upon which biodiversity studies, Red-List threat assessments, and conservation are carried out.

  A second crucial partner is the Tafea Kaljoral Senta, the local branch of the Vanuatu Cultural Centre, headquartered in Tanna. The project has provided opportunities for local field workers to participate in documenting plant diversity, their cultural uses, and indigenous names. These field workers serve as the critical link between the rest of the team and the local communities, and this relationship has opened up significant opportunities to discuss conservation needs and goals with local communities. For example, the project has identified four potential community-organized conservation areas on Tanna. Working to demarcate and strengthen these conservation areas will be an important focus for future efforts.

  Meetings with traditional leaders and other community groups on Tanna and Aneityum have also been important aspects of this project, and community members routinely participate in all field activities.

- *Short-term Impact 2: Conduct fieldwork and botanical inventories, produce provisional checklists for the flora and useful plants in Tafea province, with special focus on the three priority sites of Aneityum, Futuna, and Green Hill.*

  Six field expeditions took place during the grant period, focused particularly on collection of plant specimens to document biodiversity, ecological transects to characterize vegetation types and forest dynamics, and ethnobotanical and linguistic interviews regarding traditional names and uses of the plants, on both Aneityum and Tanna. The project team had also proposed field work on Futuna island, but this aspect of the plan could not be completed due to changes in the timeframe for field work associated with (1) a severe outbreak of Dengue fever in 2014, requiring the postponement of the first trip, and (2) the Cyclone Pam, which cut short the project's March 2015 expedition.

  A total of more than 1,500 plants were collected (mostly in duplicates of six, for a total of roughly 9,000 specimens) during this first phase of the project, representing over 1,000 plants from Tanna and just under 500 from Aneityum. A complete set of duplicates has been deposited at the Vanuatu National Herbarium, adding nearly 10% to their collections from just 2.5 years of field studies. Other duplicate sets are being distributed to institutions and specialists around the world. Conservation efforts centered on critically endangered species assume that species have been rigorously studied, and require a set of physical, geo-referenced specimens for IUCN threat assessments. In a country like Vanuatu, where almost no species have been taxonomically evaluated, such collections are the essential raw materials for these assessments. Building on this information, the scientific and conservation communities can then ascertain which species are common and widespread, vs. new, threatened or endangered, and/or endemic, allowing for more informed decisions to identify critical species and new conservation areas that can protect the greatest number of these threatened species.

  Preliminary checklists based on recent and historical collections have been prepared for Tanna and Aneityum, and additional checklists are being prepared and extended based on continually expanding collections at the Vanuatu National Herbarium, NYBG's Steere Herbarium, Missouri Botanical Garden, Smithsonian Institution, Bishop Museum in Honolulu, National Tropical Botanical Garden, and other herbaria with significant holdings of Vanuatu plant specimens, such as the Royal Botanic Gardens, Kew, Harvard University, the National Museum of Natural History in Paris, and the University of Hawaii.

- *Short-term Impact 3: Establish protocols for biodiversity and conservation assessments in collaboration with local and international institutions, to include status assessments of plant species of conservation significance (based on global conservation priority and significance to local communities) at each of the three priority sites. During this first two-year grant period, these assessments will focus on each of the sites at some level, with an initial emphasis on (but not limited to) the Green Hill site on Tanna. Data compilation will be web-based and be aided by the assistance of other specialists in plant taxonomy who will be recruited for the project.*

NYBG's recent development of streamlined methodologies for rapidly assessing the conservation status of plants using Geographic Information Systems (GIS) has been a major factor in the increased conservation impact of its scientific programs. The methods are aimed at addressing Target Two of The Global Strategy for Plant Conservation (GSPC), "An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action."

The original method incorporates herbarium specimen data and a geographic analysis based on the International Union for the Conservation of Nature (IUCN) Red List's criterion B to classify species as "At Risk" or "Not At Risk," with the At Risk category approximating IUCN's Threatened category (including Critically Endangered, Endangered, and Vulnerable species). Each species is reviewed by calculating its Extent of Occurrence (EOO, a geographic range parameter that describes the area of the smallest polygon encompassing all known localities where that species occurs). A calculated EOO of more than 20,000 km^2 (above IUCN's threshold for Threatened) indicates that a species is Not At Risk. The project's recent collections, and data recorded from thousands of historical collections, provide the materials needed for such assessments. To accomplish this, the project team has recruited and involved many additional specialists to join us in its efforts, including specialists in non-vascular plants (ferns, mosses, lichens), fungi, and select seed-plant groups (palms, Araliaceae, Sapindaceae, etc.). Through co-funding provided by the US National Science Foundation, the project is now poised to acquire both hardware (a dedicated server) and software to host these data on the Internet, making them more broadly available to a wider audience.

- *Short-term Impact 4: Training and capacity building functions will be conducted, including the training of a ni-Vanuatu student, plus capacity-building efforts aimed at improving the National Herbarium of Vanuatu; recruiting and training local teams in Tafea Province in the collection of plant diversity and ethnobotanical data; working with the Forestry Department, Department of the Environment, Vanuatu and Tafea Cultural Centres, and other relevant groups.*

  In consultation with the Department of Forestry, the project team has identified four students. Mr. Frazer Alo and Mr. Thomas Doro were recruited for training and participation in project fieldwork, and have been supported to complete their first two years towards their bachelor's degrees at the Port Vila Campus of the University of the South Pacific (USP). More recently, the project has identified two additional students who have also become involved (Ms. Stephanie Sali and Mr. Kimson Perie) through field and herbarium training. Ms. Sali is a student at the University of New Caledonia, and Mr. Perie at the Vanuatu Agricultural College.

  Physical capacity at the Vanuatu National Herbarium was improved through the rehabilitation of a dilapidated space in the Forestry building, which was renovated for use as an area for specimen drying and sorting, for storage of specimens before they are integrated into the collections, and as a storage area of supplies. A new plant dryer was constructed to improve capacity in handling and drying five time as many plant

specimens. This renovated and reinvigorated facility now serves as an important educational resource for local high-school and university students, who regularly visit, take classes, and complete internships at the herbarium.

The project also provided regular training experiences, lectures, and practica centered on fundamental issues of tropical ecosystems, plant diversity and identification, herbarium pest-management, and the development of SOPs (standard operating procedures) for the running of the herbarium.

Botanical and ethnobotanical collection teams were established in each of the areas where the project worked during this phase of the project. Generally, this involved the recruitment and training of three to five local people per site who participate in the collections and interviews.

- *Short-term Impact 5: Teaching and training materials will be developed for distribution to schools and universities, and preliminary findings will be disseminated to local communities through a variety of tools, including brochures, posters, newspaper articles, presentations at community meetings, and other relevant media and venues in a form appropriate for local communities (employing locally relevant media and messaging) to inform biodiversity conservation, sustainable resource management, and improved health care in Tafea province, including Aneityum, Futuna, and Green Hill.*

  The project has adopted a practice of re-visiting communities where collections were made and distributing reports on the last collection trip at community meetings. These extensive trip reports provide narratives and descriptions of the collections and interviews made and are widely distributed to local communities, hospitals and medical aidposts, schools, and government agencies. They document the information collected, serving as the basis for conversations aimed at improving the quality of the information collected, as well as a tool to inform other communities about the benefits of joining the project. Moreover, through the addition of a new member of the research team co-funded through the US National Science Foundation, linguist Dr. David Harrison, Co-Founder of Living Tongues Institute for Endangered Languages, developed an outreach component to help preserve the local languages through production of a plant dictionary, starting with Aneityum and south Tanna. Outreach materials during this phase of the project also included a small number of project-themed T-shirts, which were designed and produced to be given to community leaders and local project participants during informational sessions about current progress and future plans.

  Project team members (Chanel Sam and Laurence Ramon) produced an extraordinary bilingual field guide ("Remarkable Plants of Vanuatu") that documented over 260 native plants, along with original botanical illustrations in color, and names in French, English, and Bislama. Other team members assisted in editing the text, and data from the project's fieldwork, which provided indigenous plant names. NYBG Press co-published this important milestone, which is now being used as part of school curricula throughout Tafea and other parts of Vanuatu.

- *Short-term Impact 6: Work towards preparation of articles for submission to peer-reviewed journals on biodiversity, ethnobotanical, and ethnomedical data and assessments for Vanuatu, providing data, analyses, and recommendations to inform biodiversity conservation, sustainable resource management, and improved health care in Vanuatu and other Pacific islands.*

  To date, one peer-reviewed paper was published in the scientific journal *Brittonia* that described aspects of this project. In the short-term, additional papers are being prepared to publish results from pre- and post-cyclone transect data. Long-term efforts will include comprehensive annotated checklists of the plants and ethnobotanical manuals, as well as on-line linguistic "talking dictionaries."

  Other peer-reviewed publications from the project are currently in the data-gathering stage, as it is early in the 10-year project. Programmatic information and checklists of flora and useful plants will be posted on the web.

  All project data and findings have been databased and formatted in forms compatible for uploading, posting, and archiving on NYBG's C.V. Starr Virtual Herbarium and for integration with the "Vanuaflora" database at the Vanuatu National Herbarium.

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

Given that this is a long-term (10-year project), the project team has successfully accomplished the long- and short-term goals of the initial two-years, with two exceptions. First, the team was unable to work in Futuna (see above). Secondly, because of resource and time contraints, the team was unable to complete the goals to post all information on the Internet, but they now have secured those resources through co-funding, and anticipate completion of this goal in the next year.

7. Were there any unexpected impacts (positive or negative)?

The team was very moved by the extraordinarily strong interest in this project expressed by leaders and members of local communities, and their remarkable willingness to collaborate and contribute to the on-the-ground activities.

<u>Project Components and Products/Deliverables</u>

Component 1 (as stated in the approved proposal)
List each component and product/deliverable from Grant Writer

8. Describe the results from Component 1 and each product/deliverable
9. Repeat point 8 above for each Component in your approved proposal
{See below.}

- *Component 1: Project partnerships established with relevant government agencies (including in areas of environment protection, resource management, sustainable development,*

culture, and health), scientific and conservation organizations, universities and other educational institutions, local researchers, cultural institutions, health care organizations and providers, Traditional Leaders, and community organizations.

Partnerships established with: Vanuatu Departments of Forestry and Environment, Vanuatu National Herbarium, Vanuatu Cultural Centre, Tafea Kaljoral Senta, Tanna Council of Chiefs, Tafea Provincial Hospital, Aneityum Council of Chiefs, and 22 communities spread across Tanna and Aneityum.

- *Component 2: Botanical and ethnobotanical collections teams established.*

  Botanical and ethnobotanical collection teams were established in each of the areas where the project worked during this phase. Generally, this involved the recruitment and training of three to five local people per site to participate in the collections and interviews.

- *Component 3: Checklists created for flora and useful plants in Tafea province, with special focus on three sites: Aneityum, Futuna, and Green Hill.*

  Preliminary checklists based on historical collections and the project's recent field work have been databased, and are currently being assembled, but the ultimate goal will require completion of the long-term project, as outlined in our original proposal.

- *Component 4: Status assessment prepared of plant species of conservation significance, including CEPF target species, at each of the three sites. Data compilation will be web-based and the assistance of plant taxonomic specialists will be recruited for the project.*

  We have made botanical collections, including collections of target species (such as *Carpoxylon macrospermum*) at two of the three sites (excepting only Futuna; see above), have compiled data, and are preparing these data for uploading to a new server to make them available, and are sending duplicate specimens to specialists internationally.

- *Component 5: Ni-Vanuatu student(s) trained at the University of the South Pacific, including participation in botanical and ethnobotanical data collection and analysis through fieldwork, mentoring, and formal classroom learning activities.*

  As detailed above, four Ni-Vanuatu students have been trained though this phase of the project, including extensive field work, herbarium training, and (for two students) formal coursework at the University of the South Pacific.

- *Component 6: Teaching and training conducted for local community on project findings and recommendations to inform biodiversity conservation, sustainable resource management, and improved health care in Tafea province, including Aneityum, Futuna, and Green Hill.*

  Teaching and training was conducted for local community members for all 22 communities where the team worked during this phase of the project. During successive trips, we met to distribute trip reports and then discussed, reviewed,

corrected, and provided supplemental information to the reports and the data that the team collected. Lectures, presentations, and seminars were offered to a wide variety of audiences, including an international scientific conference held in the U.S., a seminar series to the general public in Port-Vila (Vanuatu's capital city), and various training sessions offered at the Department of Forestry.

- *Component 7: Dissemination materials prepared and distributed. These materials will include articles on project findings and outcomes for peer-reviewed journals. Booklets requested by local communities on local plants and ethnobotany and ethnomedicine prepared and distributed to communities.*

  A major achievement was the publication of the "*Remarkable Plants of Vanuatu*," a bilingual, full-color field guide of the plants of Vanuatu by project team members Laurence Ramon and Chanel Sam, with assistance from several other team members, and co-published by NYBG Press, which continues to be distributed in Tafea.
  As discussed above, trip reports and data were distributed widely to communities.

- *Component 8: Section on project information posted on NYBG Website.*

  On-line information pages and blogs have been created on the NYBG website. A longer-term effort to establish an on-line accessible database is currently underway, and funds from the US National Science Foundation will support the purchase of hardware (a server) and software (database programs) to host these data, along with funding for personnel to implement the new database. On-line talking dictionaries for two (of the eight) languages have already been developed and are available in beta-testing format.

- *Component 9: Compliance with CEPF Social Safeguard Policies monitored and reported to CEPF.*

  The program complied with all CEPF Safeguard Policies.

- *Component 10: (Supplemental Grant) During August 2015, Ms. Laurence Ramon, Herbarium Attachée, will oversee the continuation of a project to extend the curation of the Vanuatu National Herbarium (PVNH), which she commenced several years ago in collaboration with the Herbarium staff, Mr. Chanel Sam and Mr. Philemon Ala. With the recent completion of a new herbarium facility and the acquisition of new specimen cabinets, Ms. Ramon will assist the herbarium staff in the orderly transfer of the last remaining specimens from the old facility to the new herbarium, and the completion of the "Vanuaflora" database by adding roughly 1,500 new specimen entries into the database of >11,000 records, and the entire database will be made available online, and backed up through off-site institutions (Nouméa and Montpellier) for long-term archiving. Ms. Ramon will also coordinate the preparation and shipment of specimen duplicates to appropriate international herbaria with important collections from Vanuatu, including Paris, New York, Nouméa, and Montpellier. Ms. Laurence will also conduct a workshop on "Assessment and recording of the plant biodiversity: the role of the National Herbarium for quality taxonomic identification."*

The project transferred all of the collections from the old herbarium to the new and improved herbarium. All these collections were databased as they were transferred.

An additional 1,500 specimens in PVNH were recorded in the local database of the country flora of Vanuatu—Vanuaflora. This was mainly the work of Mr. Fraser Alo, the student trainee for the project.

In addition, 82 duplicates were sent to France. Of these, 36 specimens were sent to Montpellier (France) for study and identification. Duplicates were also set aside for a shipment to NYBG.

The local database was updated to the Publish-Plantnet webserver, which manages several digital herbaria around the world. A list of Vanuatu taxa, which can be downloaded, is now available on the Vanuaflora web site at http://publish.plantnet-project.org/project/vanuaflora_en.

A one-day seminar was held to raise awareness among local NGOs and government agencies on how botanical collections should be used in environment-related projects. Fifteen people participated in the seminar, including personnel from the Vanuatu Forestry Department, including an officer of the REDD+ Program, and from the Vanuatu Department of the Environment, including an officer of the invasive species program.

- *Component 11: Starting in November 2015 and continuing throughout the grant period (June 2016), the project team will coordinate with local communities in Southwest, Southeast, and North Tanna to initiate a long-term plan for establishing a network of conservation areas. The plan comprises several related activities: (1) Combining information about local priorities with data collected during the project's recent botanical and vegetation surveys, the project team will consult with communities to identify the primary-forest areas of greatest conservation concern. The project will begin a process with local land-owners to establish agreements regarding these areas, to demarcate them, and to initiate a process at the national level to have these areas formally recognized. (2) The project team will work with local communities to establish a system to help exclude non-native herbivores from the conservation areas. (3) Together with local landowners, the project team will identify degraded areas (secondary forests and old gardens) that can be rehabilitated for use as agro-forests. Rehabilitation will ultimately involve reforestation efforts using mostly native, high-value timber trees (Canarium indicum, Endospermum medullosum, Santalum austrocaledonicum, and Terminalia catappa) and perhaps one non-native species (mahogany, Swietenia sp.), but this part of the proposed activity will be pursued in later phases (after June 2016), pending funding. The immediate activity will involve identifying boundaries, improving access-paths, and cleaning the abundance of debris resulting from Cyclone Pam. (4) The project team will work with local communities to identify the highest priority ecosystem services (clean water, food, timber, medicinal and cultural plants, etc.) associated with the planned conservation areas and agro-forests. The concept of "forest-as-source-of-clean-water" has already been recognized as a top priority, especially in the wake of the cyclone (March 2015) and the subsequent, on-going drought associated with the current El Niño event, both of which have seriously threatened the availability of clean water throughout Tanna. To promote greater awareness of this ecosystem service, and to encourage greater protection of the forested areas, the project team will assist local*

communities to install new water-catchment systems in places where such systems are either lacking or have been badly damaged/destroyed. (5) The project team will also work with the Department of Forestry to improve the National Herbarium facility in Port Vila. Much of the research underpinning the conservation efforts in Tanna (and throughout Tafea) rely on the collection of scientific specimens deposited at the Vanuatu National Herbarium, with duplicates distributed to important herbaria abroad. The current herbarium facility lacks sufficient space and equipment to process these specimens efficiently. The project team will work to refurbish an unused room (immediately adjacent to the current herbarium) to provide space for sorting, mounting, storing, and packaging (for shipment) of specimens, and for storage of field equipment (plant presses, etc.). The herbarium does not have a specimen dryer, and currently borrows an incubator to dry specimens, which does not function effectively as it has no ventilation. Therefore, the project will also construct a plant-specimen dryer for use by the project team and the staff of the National Herbarium. This dryer will have at least five times the capacity of the current incubator, and will be properly ventilated, allowing many more specimens to be dried in less than half the time. This improvement will also help to reduce energy costs (for electricity) incurred by the project and the herbarium, and will advance the National Herbarium's mission as a repository for biodiversity specimens and data.

At the start of the supplementary project, (August 2015), the team met with community leaders and members to determine short-term needs related to conservation and the environment, in response to Cyclone Pam. All communities agreed that preserving forests as sources of clean water were among the highest priorities. The team put together short- and long-term strategies to accomplish these goals, and CEPF generously agree to provide a supplement for the short-term goals in September and October. During the November-December 2015 trip, surveys of water sources and water-delivery systems were conducted (with the aim to initiate installation in February 2016). After ecosystem services were identified, equipment for water catchment systems were purchased, delivered, and installed (starting in February 2016) in three areas of Tanna, serving nine villages and providing clean water to over 1,000 men, women, and children who had limited or no close access to water for drinking, cooking, or bathing prior to the implementation of this goal. Following the implementation, community meetings were held during the April and December 2016 trips at all three areas to reinforce the conservation goals associated with the project.

Materials for exclusion systems (fencing materials and various tools) were purchased and delivered to communities on Tanna in December 2016, and the communities are presently involved in setting these areas up.

Degraded areas have been identified, but funding for rehabilitation was not provided.

A dilapidated space in the Forestry building was rehabilitated and renovated for use as a specimen drying, sorting, and storage area for the National Herbarium. A new plant dryer was constructed to improve capacity in handling and drying many more plant specimens (collected as the basis for biodiversity inventories).

10. If you did not complete any component or deliverable, how did this affect the overall impact of the project?

Given our original plan for a 10-year project, the fact that some deliverables were not completed in the first three years will not affect the overall impact of the project in a negative way.

11. Please describe and submit any tools, products, or methodologies that resulted from this project or contributed to the results

A copy of the "Remarkable Plants of Vanuatu" and copies of all trip reports have previously been sent to CEPF.

Benefits to Communities

12. Please describe the communities that have benefited from CEPF support

*Please report on the size and characteristics of communities and the benefits that they have received, as a result of CEPF investment. Please provide information for all communities that have benefited **from project start to project completion**.*

	Community Characteristics											Nature of Socioeconomic Benefit								
								Size of Community												
Community Name	**Subsistence economy**	**Small landowners**	**Indigenous/ ethnic peoples**	**Pastoralists / nomadic peoples**	**Recent migrants**	**Urban communities**	**Other***	**50-250 people**	**251-500 people**	**501-1,000 people**	**Over 1,001 people**	**Increased access to clean water**	**Increased food security**	**Increased access to energy**	**Increased access to public services (e.g. health care, education)**	**Increased resilience to climate change**	**Improved land tenure**	**Improved recognition of traditional knowledge**	**Improved representation and decision-making in governance forums/structures**	**Improved access to ecosystem services**
Green Hill	X	X	X						X			X						X		X
Nusemetu	X	X	X					X				X						X		X
Yenhup	X	X	X					X				X						X		X
Yensur	X	X	X					X				X						X		X
Inemra	X	X	X					X				X						X		X
Iatukwei	X	X	X					X				X						X		X
Yapkapen+High Hill	X	X	X						X			X						X		X
Imaki	X	X	X						X									X		
Kwamera	X	X	X					X										X		
Anelcauhat	X	X	X						X									X		
Umej	X	X	X					X										X		

*If you marked "Other" to describe the community characteristic, please explain:

Lessons Learned

13. Describe any lessons learned related to organizational development and capacity building.

One lesson learned related is the necessity to make clear from the earliest possible point the distinction between benefits to the community vs. benefits to the individual. Most project partners understood this distinction intuitively, but the project team did face the need to explain this more explicitly during a few instances.

14. Describe any lessons learned related to project Design Process *(aspects of the project design that contributed to its success/shortcomings)*

See combined answer for #14 & 15 under #15.

15. Describe any lesson learned related to project Implementation *(aspects of the project execution that contributed to its success/shortcomings)*

Related to the design process, the project team learned that community awareness, understanding, and involvement in all aspects of the project design and implementation is essential to its success. The team learned from community members of some earlier projects, designed by outsiders with little local participation and without regular reporting, were not received favorable at the local level. The project team was wisely counseled by community leaders to take a "bottom-up" approach and to show frequent progress towards stated goals.

16. Describe any other lessons learned relevant to the conservation community

The strategy of establishing conservation areas centered around critically endangered species is applied globally, but the project team has found this approach to be impractical in Vanuatu at present. The flora of Vanuatu is currently estimated at ~1,500 species, but this is certainly a gross underestimate, suggesting that many new species and knowledge of their distributions remains to be discovered. Apart from a very limited number of plant groups (notably orchids, ferns, and some palms), virtually all of the plant groups in Vanuatu lack formal taxonomic assessments, which means the basic criteria for understanding these plants as "good species" is also lacking. Moreover, of the 1,574 organisms from Vanuatu that have been assessed using IUCN Red List criteria, only 72 are plants, and the vast majority (55) of these are widespread LC (least-concern) species assessed from other countries. When considering the entire flora of Vanuatu, the team was shocked to learn that there is only a single plant species listed as CR (critically endangered) and only three as EN (endangered). Finally, such threat assessments require and depend upon the presence of a robust database of actual collections with reliable geocoordinates, a prerequisite that is largely lacking in Vanuatu (in contrast to other priority areas, such as New Caledonia and Fiji). Clearly, there is a dire need for additional baseline data and taxonomic studies in Vanuatu in order to ensure the wise investment of conservation resources and actions.

Sustainability / Replication

17. Summarize the success or challenges in ensuring the project will be sustained or replicated

The challenge in Vanuatu is (1) the scarcity of highly trained and motivated biodiversity specialists, and (2) the lack of resources to train such students. At present, formal university training (at least at the bachelor's level) is required for a position in the Forestry or Environment departments. Before this project, no young investigators had been identified to succeed a generation of biodiversity leaders (trained before independence) who are set to retire in the immediate future. The project leaders firmly believe that the sustainability, replication, and continuation of a project such as this one will depend on formation of such a cadre of highly trained and motivated biodiversity specialists. This challenge is the primary reason why they have made such a strong effort to identify and begin training four eager and excellent students, and to seek continued funding to ensure the opportunities for their success.

18. **Summarize any unplanned activities that are likely to result in increased sustainability or replicability**

In a culture experiencing rapid economic and social change, the unexpected impact of Cyclone Pam, proved to be a very powerful lesson in convincing people of the importance of biodiversity, traditional knowledge, and the need to live in harmony with their environments. During the work of the project in Vanuatu, the team witnessed many workshops, awareness meetings, educational posters, and other approaches to raise awareness of these lessons among local people, but the single event of the cyclone did more to drive home this message than all other efforts combined.

Safeguards

19. **If not listed as a separate Project Component and described above, summarize the implementation of any required action related to social and environmental safeguards that your project may have triggered**

The project has gone beyond mitigation to provide positive impacts on the environmental and social well-being of communities in Vanuatu. This work includes providing baseline biodiversity and ethnobotanical data upon which environmental conservation and sustainable resource management are based; building local and regional scientific and conservation capacity through training of local stakeholders and their involvement in project activities; making plans for community-managed protected areas; providing ethnomedical data through collection of medicinal plants and ethnobotanical interviews; building relationships with local health care institutions for planning and implementation of program components to improve public health; and reinforcing local interest in enhancing resilience by the community members and their traditional leaders. Additionally, prior informed consent was obtained from community members involved in the project, and ABS protocols were followed.

Additional Funding

20. 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 CEPF investment

Donor	Type of Funding*	Amount	Notes
The Christensen Fund	A	$200,000	Funds restricted to cultural studies of plant use, indigenous names, and capacity building
National Geographic Society	A	$40,310	Funds restricted to general plant collecting, and re-surveys of transects following Cyclone Pam
US National Science Foundation	A	$676,426	Funds restricted to plant collection, taxonomic studies, and linguistic component

** Categorize the type of funding as:*

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)

Additional Comments/Recommendations

21. Use this space to provide any further comments or recommendations in relation to your project or CEPF

NYBG, the Department of Forests, and the communities of Tafea Province with whom the project team is working greatly appreciate the continued support from and interest of the Critical Ecosystem Partnership Fund. All of us involved in this endeavor look forward to advancing our work with CEPF in efforts to promote environmental and social resiliency in Vanuatu. It is our hope that our joint efforts will also serve the wider Pacific Island region as a model of how institutions and communities can work together towards many important goals in this time of intensive global change.

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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