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## NCCARF Travel Grant Summary Report

Collaborative visit August 2010

### *Pollination by native bees in the face of habitat fragmentation and climate change*

Bees are the single-most important group of invertebrate pollinators (Michener 2007). In Fiji, the extent of native bees is poorly understood despite their importance in terrestrial ecosystems, and agricultural crop production. With impending adaptations in response to changing climatic conditions, in addition to shifts in land use, understanding the necessary steps to ensure the sustainability of ecosystem processes could not be more important.

### Major findings

Approximately 600 specimens were collected from almost 70 localities across the 3 main islands (Viti Levu, Vanua Levu, Kadavu) and represent almost all of the 11 known species for the islands with at least one previously unrecorded species of the *Amegilla* genus. Collections were conducted in some of the more remote areas of the islands, particularly within the central highlands of Viti Levu and within the valleys of central Kadavu. It is hoped these areas, which are not likely to have been previously sampled, will yield further interesting results once genetic analyses have been completed.

The visit helped our group establish an understanding of the main climatic areas of the island, i.e. rainfall in the southwest vs. northeast of Viti Levu. This is important in targeting sites with possible high bee diversity, particularly when focussing on particular bee species (i.e. ground nesting vs. stick nesting). The distribution of agricultural areas relative to the climatic areas was also important to understand. The Sigatoka valley of southwest Viti Levu and Labasa in the north of Vanua Levu are both major production areas, and therefore, are important for any investigation into the role of bee fauna in crop yields.

### Outcomes of collaboration

My experience collaborating with the Secretariat of the Pacific Community (SPC) has built relationships with not only the Centre for Pacific Crops & Trees but also the Land Resources Division, an important group in terms of agricultural education. Furthermore, I was able to meet with members of the Agronomy and Animal & Health Production Divisions of the Ministry of Agriculture, and also the South Pacific Regional Herbarium based at the University of the South Pacific. The development of such relationships will ensure the major findings of the collaboration are communicated into biodiversity conservation and local resource management. The meetings also highlighted further potential for collaboration through the Entomology Division of the Ministry of Agriculture, where native bee-focussed research has previously been overlooked.

The collaboration also enabled me to increase my limited understanding of tropical botany. This includes temporal variation in flowering periods, and also the extent of the Myrtaceae Family in the Pacific islands. Both birds and bees in Australia commonly pollinate this Family, thus Fijian species have been identified for further investigation into possible pollination syndromes.

Aside from academic outcomes, I was able to develop important cultural skills while being accommodated in remote villages. Particular experiences include participating in presentation of *sevu sevu*, working as part of a culturally diverse team for extended periods, and learning basic Fijian language skills.

inspiring  
achievement

## Significance to adapting and protecting Australia's terrestrial biodiversity

In terms of terrestrial biodiversity in Australia, this collaboration will provide a solid foundation for further investigations based in South Australia into climate change adaptation due to commence during this coming Spring. It will also allow investigation of latitudinal variation of diversity, which is important for any area such as South Australia where "Goyder's Line" is has been predicted to shift southward.

It can also enable us to look at the effect of what appears to be a small number of generalist species providing a critical ecosystem service to terrestrial systems across the whole island group. If this is the case, it will provide important insight into issues that may arise in Australia's increasingly fragmented landscapes. Obviously, specialist pollinators will be under severe threat of extinction, however, generalists may be able to adapt to any shift in environmental/temporal niches.

Considering the distribution of bee diversity across the landscape may provide insight into population dynamics, where a patchy distribution may reveal more specialised and static populations, and uniform distribution would resemble more generalist and dynamic populations.

## Conclusion

In summary, the collaboration has enabled me to make significant contacts within Fijian research groups that will provide an important foundation for my research. I have also gained a substantial increase in my knowledge of tropical botany and also of fragmented population dynamics, which my doctoral project will benefit from greatly.