Mapping the vegetation of Diego Garcia Island, British Indian Ocean Territory. November 2018

Fieldwork report and photographic supplement - Overseas Fieldwork Committee (OFC) registration number 893

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CHAGOS CONSERVATION TRUST

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Acknowledgements

Kew's team would like to thank the Chagos Conservation Trust (CCT) for the financial support for this trip and to Helen Pitman, Director of Chagos Conservation Trust for facilitating and encouraging our funding application.

Our colleagues at Kew, Dr Colin Clubbe, Dr Martin Hamilton, Dr Justin Moat and Ms Jenny Williams for sharing their expertise and help in preparing the field trip logistics and data.

We are grateful to all at the British Indian Ocean Territory Administration (BIOTA), for their initial encouragement of our plans and advocacy in our deploying the UAV to Diego Garcia and for help with permits and support with expedition logistics. The Movements Office, in Diego Garcia for logistics support and the Passenger Terminal Supervisor, AMC facilities Bahrain for help navigating through customs requirements in Bahrain.

Finally, we would like to thank the BritRep, from the British Royal Navy in BIOT for welcoming us and allow us to carry on our research on the island of Diego Garcia. We are most thankful to US commanding officer (CO) and the air traffic control team in extending their cooperation and support.

Suggested citation

Bárrios, S. and Wilkinson, S. (2018). *Mapping the vegetation of Diego Garcia Island, British Indian Ocean Territory. November 2018. Fieldwork report.* Overseas Fieldwork Committee registration number 893. Richmond, Surrey, U.K.: Royal Botanic Gardens, Kew.

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Figures

Unless otherwise noted, all figures are © S. Bárrios and © Timothy Wilkinson.

Cover photo

Air photo of the vegetation on the island of Diego Garcia. Image recorded with a SODA camera flown on an eBee Plus unmanned aerial vehicle.

In-text photos

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List of participants

Initials	Name	Position & Organisational affiliation
SB	Sara Barrios	Conservation Partnership Coordinator (UKOTs). RBG Kew
TW	Tim Wilkinson	Spatial Analyst (Spatial Analysis Team. RBG Kew
HM	Harri Morrall	Environment Officer. British Indian Ocean Territory Administration
MS	Mark Spalding	British Indian Ocean Scientific Advisor. British Indian Ocean Territory

Acronyms

Acronym	Definition
Air Boss	Air Operations Officer
AMC	Air Mobility Command
BIOTA	British Indian Ocean Territory Administration
Brit Rep	Royal Navy Commander, Commissioner's Representative
CCT	Chagos Conservation Trust
DG	Diego Garcia
UKOTs	UK Overseas Territories

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Introduction

This report is an account of the UK Overseas Territories (UKOTs) Programme and the Spatial Analysis Teams of the Royal Botanic Gardens, Kew (Kew) expedition to the British Indian Ocean Territory (BIOT) island of Diego Garcia (DG). The expedition took place from the 12th to the 28th November 2018. The visit was undertaken to enable ground truthing of the main and associated islands in order to validate, augment and give metrics for the vegetation map of these areas. The main objectives of the expedition were:

- collect ground truth data on the terrestrial vegetation for Diego Garcia;
- capture 360° imagery of the island as a baseline reference dataset for areas of special interest;
- perform UAV flights (fixed wing) to capture as much of the island as possible;
- collect data and plant material to increase our knowledge of native and invasive plant species, assemblages, abundance, habitats and overall distribution;
- collect seeds and spores for RBG Kew's Millennium Seed Bank for long-term conservation and potentially for the island nursery to aid habitat restoration;
- engage with BIOT scientific staff and military base volunteers on plant conservation activities.

The expedition was undertaken with the consent of the British Indian Ocean Territory Administration, which provided the team with a research permit. The Kew field team consisted of Ms Sara Barrios and Mr Tim Wilkinson.

Figure 1: Map of Diego Garcia island, British Indian Ocean Territory

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This work compliments an earlier CCT Darwin CAREX project which mapped the vegetation of the islands of Peros Banhos, Salomon Islands, Great Chagos Bank and Egmont Islands. Within the active John Topp Legacy Project, satellite imagery from the very high-resolution optical sensor system Worldview-2 was purchased in both the multispectral (2m ground resolution) and panchromatic (0.5m ground resolution), this will be used to derive a vegetation classification of the islands. Prior to this field trip, only very limited ground truth data was available for Diego Garcia's vegetation to guide the classification process and validate the accuracy of the classified vegetation map.

Summary of daily activities

DG November 2018		
Day	**Date**	**Activity**
Monday	12/11/2018	Travel London to Bahrain
Tuesday	13/11/2018	Travel Bahrain to DG
Wednesday	14/11/2018	Orientation and Logistics.
Thursday	15/11/2018	Field work and UAV flights: West Diego Garcia.
Friday	16/11/2018	Field work and UAV flights: BIOT Plantation.
Saturday	17/11/2018	Field work and UAV flights: BIOT Plantation.
Sunday	18/11/2018	Field work and UAV flights: BIOT Plantation.
Monday	19/11/2018	Field work and UAV flights: BIOT Plantation.
Tuesday	20/11/2018	Field work: BIOT Plantation.
Wednesday	21/11/2018	Field work: BIOT Plantation. Public presentation
Thursday	22/11/2018	Field work: BIOT Plantation.
Friday	23/11/2018	Field work: BIOT Plantation.
Saturday	24/11/2018	Field work: BIOT Plantation.
Sunday	25/11/2018	Field work: West DG; preparing collections for shipping
Monday	26/11/2018	Ship Collections. Report and Data Processing.
Tuesday	27/11/2018	Travel DG to Bahrain
Wednesday	28/11/2018	Travel Bahrain to London

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Collection and survey work

Below is a map showing the location for all observation points (186 in total) and botanical collections (34 in total) made during this field work. These botanical data will be made available online via the UKOTs Online Herbarium. A list of the collection made is presented in Appendix 1.

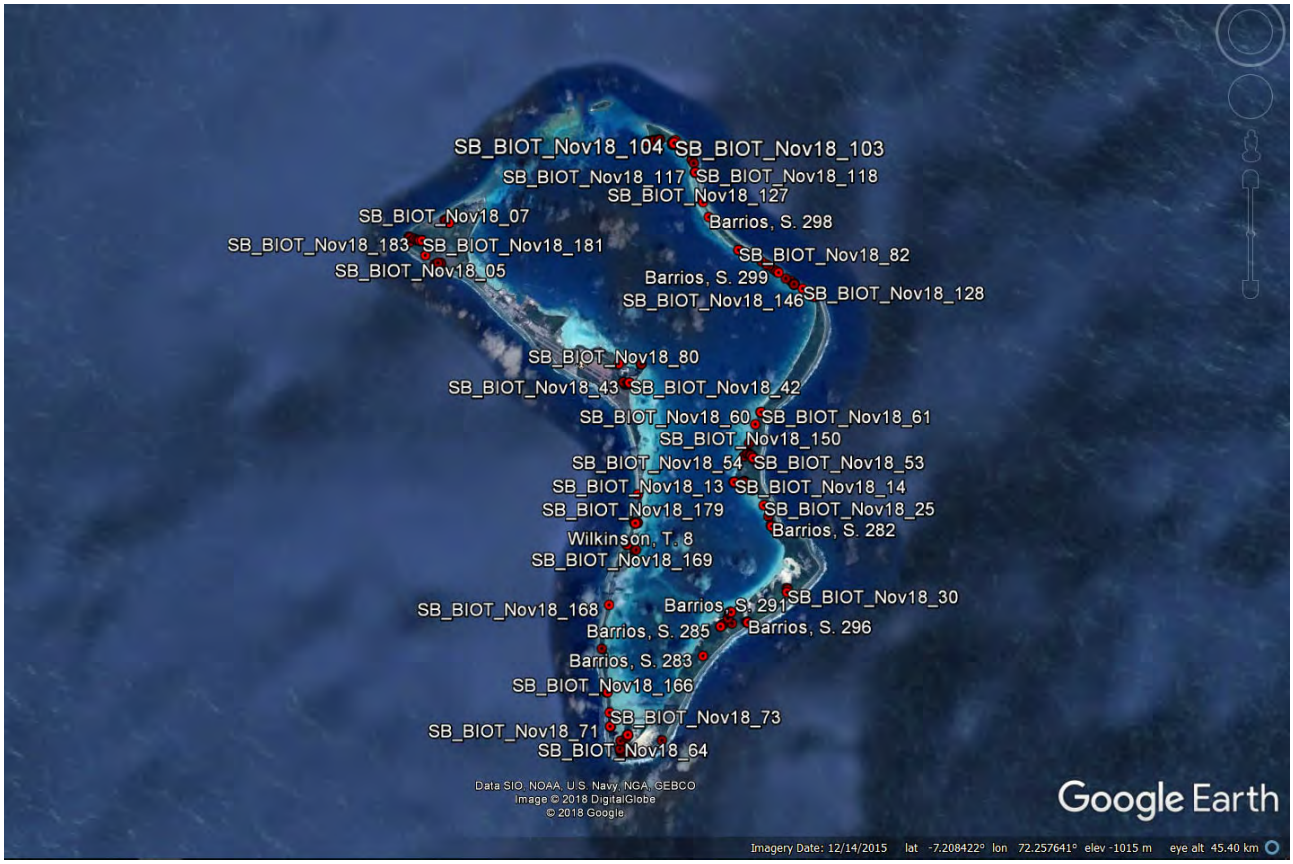

Figure 2. Map of all observation data and collections made during the field trip.

All objectives for collecting appropriate ground truth data were substantially meet. The dataset collected adequately describes the variation in vegetation canopy assemblages across the main Diego Garcia atoll and includes all target land cover classes. A significant exception being that the team were not able to access and survey the channel islands (West, Middle and East). In addition to traditional recording of ground truth points with survey forms and 2D photos the team experimented capturing records with 360° photos. Annotated habitat images recorded using 360° camera technology are available to view via the following link:

https://poly.google.com/view/8WiT63GlWHJ

Observation of native and introduced species where also recorded, when possible, in a dedicated iNaturalist page:

https://www.inaturalist.org/projects/the-terrestrial-biodiversity-of-the-british-indian-ocean-territory-biot

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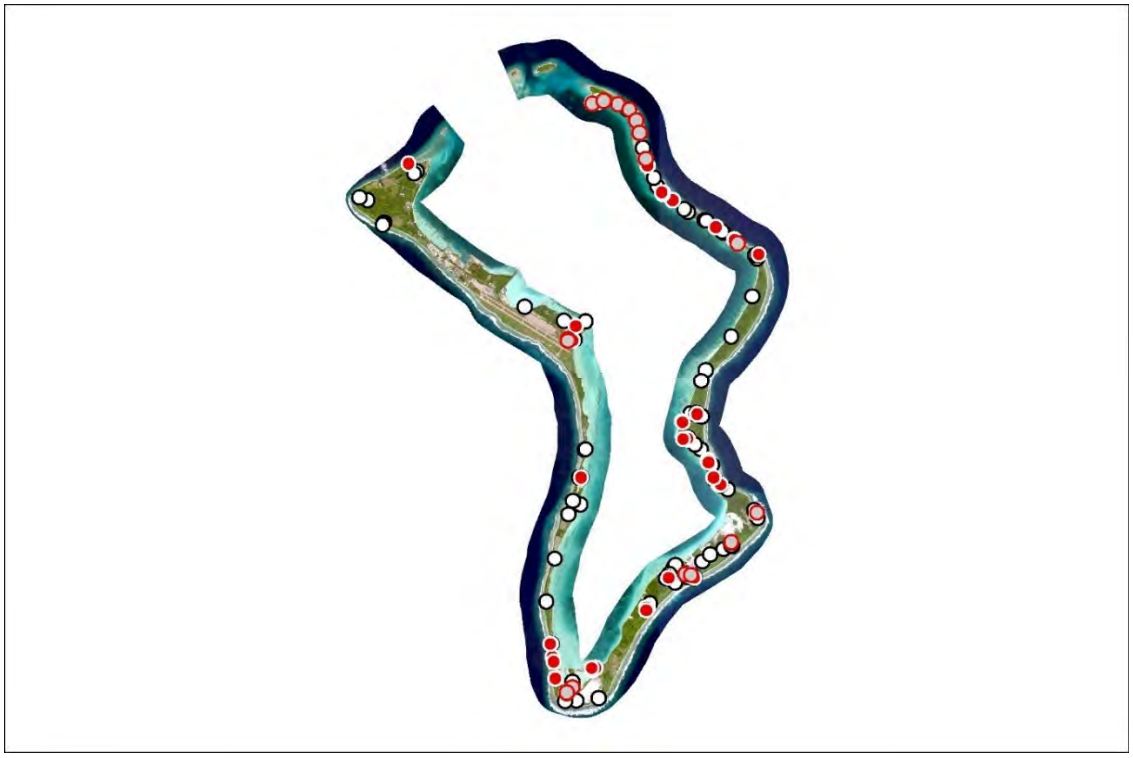

Figure 3. Collection of ground truth and ancillary points.

Notes on field observations

Native species

The native flora of the Chagos archipelago, which include Diego Garcia, is considered to comprise 41 species of flowering plants and four species of fern, plus a wide variety of mosses, liverworts, fungi and cyanobacteria. No endemic species of plant have been identified yet, possibly due to the young age of this land mass. BIOT flora is composed of pantropical widespread plant species (UKOTs Online Herbarium 2019). However, a few species are worth highlighting.

***Achyranthes aspera* var. *velutina* (Hook. & Arn.) C.C.Towns.** This native woody herb, native to Micronesia, is according to Whistler (1996), locally rare. Several of its relatives from Hawaii are threatened with extinction (Whistler 1996). We found this species on open grassland or along the path inside the restricted area (BIOT Plantation), close to seabird nests, suggesting that this species might depend on free fertiliser provided by the birds. Any treat that affects the seabirds, like the presence of rats, might also be contributing for the low numbers of individuals on each subpopulation. Below are photos taken on Diego Garcia of this species and a map showing the records of this species on the island of Diego Garcia and the channel islands, from the UKOTs Online Herbarium. During this expedition, we added the first detailed geo-referenced observations and one collection for the restricted area (BIOT Plantation) on Diego Garcia.

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Figure 4. Native *Achyranthes aspera* var. *velutina*. Detail of infructescence (left) and habit (right).

Figure 5. Records of native *A. aspera* var. *velutina* on the island of Diego Garcia and channel islands held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n. and collection number SB298.

***Pisonia grandis* R.Br.** This is a large tree has sticky fruits that are dispersed by birds. This species is common across the archipelago but rare on Diego Garcia (Topp 1998; Whistler 2005). According to data held at the UKOTs Online Herbarium and data gathered during this expedition, this species is more abundant at Barton Point and the eastern arm of the restricted area.

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Figure 6. Large native *P. grandis* at Barton Point within the restricted area on Diego Garcia.

Figure 7. Records of native *P. grandis* on the island of Diego Garcia and channel islands held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n.

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***Intsia bijuga* (Colebr.) Kuntze.** We decided to include this species on the list of native species to highlight because it was one of the native species that we saw the least amount. According to records held in the UKOTs Online Herbarium and our observations during this expedition, it is restricted to the area around Minni-Minni. A targeted survey in order to map the full distribution of this species on DG is recommended.

Figure 8. Leaves of a young specimen of native *I. bijuga*.

Figure 9. Records of native *I. bijuga* on the island of Diego Garcia and channel islands held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n.

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***Cassytha filiformis* L.** This is a parasitic vine in the family Lauraceae which gets a mention in this report to highlight that this is a native species. Because of its growing habit there is a local perception that this species is invasive and causes harm to the native flora. This is a twinning vine which is pantropical and considered native on the Chagos archipelago.

Figure 10. *Cassytha filiformis* L.

Forest with native species and less coconut trees. On several spots of Diego Garcia, within and outside the restricted area, there are forests less affected by the plantations, where *Cocos nucifera* (coconut tree) is not the dominant species. On such areas we observed more plant diversity, and generally more biodiversity, such as seabirds. These areas should be a priority for plant conservation on Diego Garcia.

Figure 11. Native tree, *Hernandia Sonora* L., supporting a healthy population of native fern *Asplenium nidus*. Photo taken near Simpson Point, on the western arm of DG.

Main introduced species

These are species which we observed during this expedition which are introduced and possibly invasive species to the Chagos archipelago and detailed studies about their true impact to local biodiversity and possible removal should be considered. The main objective of this expedition was not to map the fully extent of invasive species. Only opportunistic records were taken.

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***Casuaria equisetifolia* L.**. This tree is considered native to Australia and to Asia, more specifically to Thailand, Myanmar and Vietnam extending to Malaysia, to French Polynesia, New Caledonia, and Vanuatu. It is considered an invasive species in the Caribbean, Southern United States and Brazil. There are some questions if this species is native or introduced in the Chagos Archipelago. However, its distribution on Diego Garcia, near paths and disturbed areas, suggests that this is an introduced species. According to the Global Invasive Species Database (2019), is this a fast-growing plant which can creates dense monoculture thickets, permanently changing light, temperature, soil chemistry and hydrology of the habitats it invades. The full distribution on Diego Garcia should be mapped and monitored.

Figure 12. *C. equisetifolia* tree observed on the restricted area, growing near native *Scaevola taccada*.

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Figure 13. Records of *C. equisetifolia* on the island of Diego Garcia held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n.

***Tabebuia heterophylla* (DC.) Britton**. This tree is native to the Caribbean. Its location on Diego Garcia, near paths and disturbed areas, suggests that this is an introduced species which can spread vigorously. Many seedlings were observed behind the Plantation manager house, on East Point Plantation. The full distribution on Diego Garcia should be mapped and monitored. Control of this species should be considered.

Figure 14. *T. heterophylla*. Leaves (Left) and habit (right).

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Figure 15. Records of *T. heterophylla* on the island of Diego Garcia held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n.

***Bryophyllum pinnatum* (Lam.) Oken.** This succulent plant is native Madagascar and Cook Islands. On Diego Garcia we observed large patches of this plant along the main path on the restricted area. We also observed plants in flower and fruits which means that the species is spreading vegetative and by sexual reproduction. The full distribution on Diego Garcia should be mapped and monitored. Control of this species should be considered.

Figure 16. *B. pinnatum* observed along the paths on the restricted area on Diego Garcia.

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Figure 17. Records of *B. pinnatum* on the island of Diego Garcia held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n.

***Rivina humilis* L.** This herb is native to Tropical & Subtropical America. It is widespread on Diego Garcia and on some parts of the island it is the dominant understory species. The full distribution of this species on Diego Garcia should be mapped and monitored. Control of this species should be considered, although because of its already widespread distribution full eradication may not be possible.

Figure 18. *R. humilis* inflorescence with white flowers (left) and infructescence with red fruits (right)

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Figure 19. Records of *R. humilis* on the island of Diego Garcia held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n.

***Leucaena leucocephala* (Lam.) de Wit**. This tree is native to Central America and Mexico. It is considered an invasive species on all other locations. On Diego Garcia this species is found on very disturbed areas but still on small numbers. However, flowers and fruits were observed during this survey. The full distribution on Diego Garcia should be mapped and monitored. Control of this species should be considered.

Figure 20. *L. leucocephala* inflorescence with white flowers (left) and green fruits (right).

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Figure 21. Records of *L. leucocephala* on the island of Diego Garcia held on the UKOTs Online Herbarium, including the records obtained during this expedition. Geo-referenced records for the restricted area on Diego Garcia obtained during this expedition are identified as Barrios, S. s.n.

Rattus rattus. During this expedition, not a day went by that the team didn't observe large numbers of rats. Mainly within the restricted area, BIOT Plantation, where the rare plant species and bigger seabird colonies are located. We observed rats eating coconuts and fruits from other plant species. This invasive species is a serious problem on this part of the island, competing for food with the native coconut crab, impacting plant species reproductive capacity (by eating fruits) and probably predating seabird eggs. Eradication of this problematic invasive species is urgent.

Figure 22. *Rattus rattus* observed on BIOT Plantation.

UAV Flights

16/11/2018

UAV flight log

Arrive East Point Plantation Settlement set-up drone and connect. Prepare for launch, then persistent rain sets in. Rain clears, and attempt first flight, to assess take-off and landing approaches relative to obstacles, 2 photos. Fairy terns initially agitated by presence of drone at a certain proximity to their roost/nests. Second flight, Mission 2, East Point Plantation Settlement and northwards from the

settlement, take-off with full mission and landing, 42 photos. Third flight, Mission 3, from the settlement southwards, 35 photos.

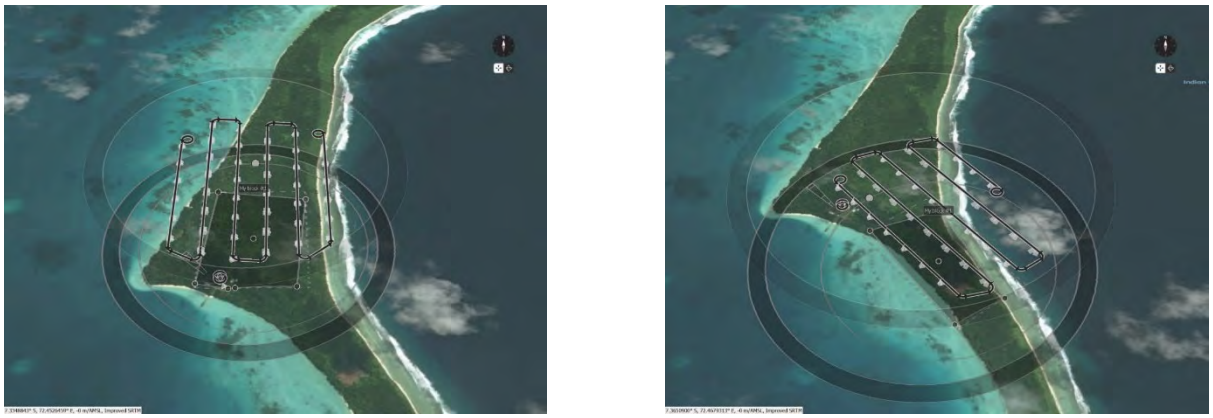

Figure 23. Figure 35. UAV Flight plan missions 2 and 3.

Figure 24. The eBee Plus, Unmanned Aerial Vehicle, used to gathered aerial images. TW demonstrates to MS the eBee Plus flight planning at East Point Plantation Settlement. SB launching the eBee Plus at East Point Plantation. Photo on the right © Mark Spalding.

17/11/2018

UAV flight log

Find excellent take-off/landing site at Barochois Maurice. Two flights, missions 6 and 7, over Barachois Maurice, missions 6, 47 photos and mission 7, 79 photos.

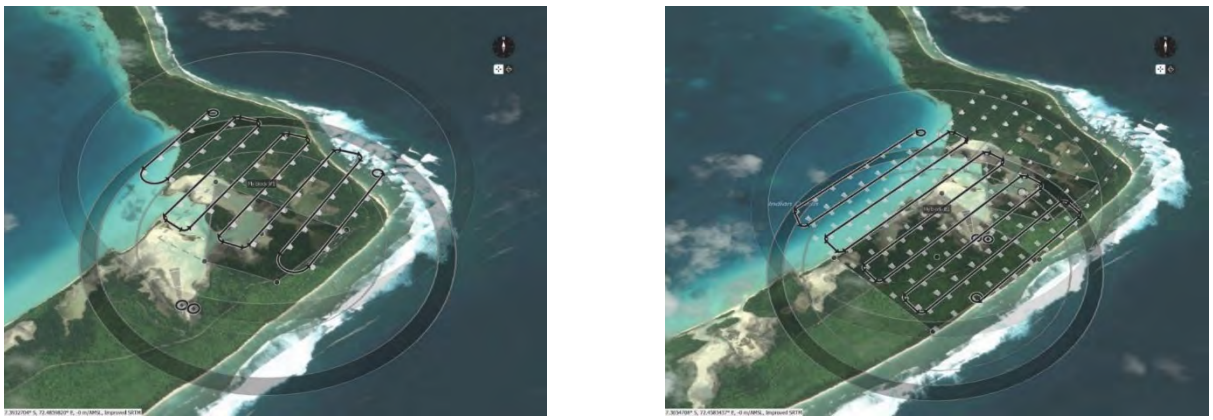

Figure 25. UAV Flight plan missions 6 and 7.

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Figure 26. Barachois Maurice. TW planning flight path for eBee Plus. 360° camera Ricoh Theta V. SB launches eBee Plus.

18/11/2018

UAV Flight Log

Reconnoitrer barachois opposite to rifle range with aim to drone down to the Diego Garcia restricted area entrance and north to connect with earlier UAV missions. Decide site is suitable take-off/landing site. Return to truck and collect equipment and return to site and set-up. Launch mission 8, but abort as tide coming in much faster than anticipated, 4 photos.

19/11/2018

UAV Flight Log

In the afternoon check the barochois and find that they are still inundated. Instead decide to use the track, Diego Garcia Highway 1, as a take-off/landing site. Two successful missions, the first, mission 8, down towards Diego Garcia restricted area entrance, 66 photos. The second, mission 9, 81 photos, to connect up with earlier mission.

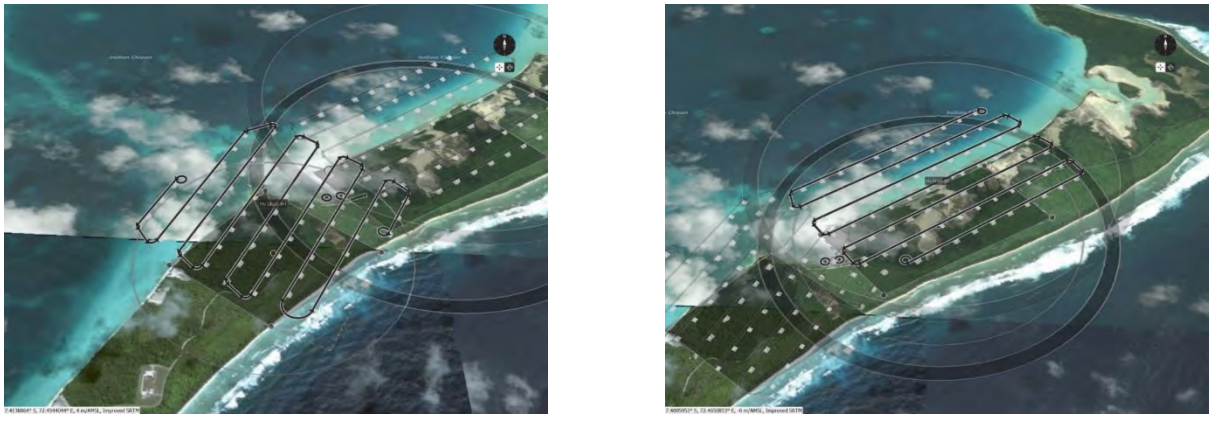

Figure 27. UAV Flight plan missions 8 and 9.

Although an ancillary objective the UAV survey flights proofed successful. Initial processing of the UAV imagery, using AgiSoft Photoscan Professional (Version 1.5.0) (Software). (2018), shows great promise, appendix 2. In total 6 flights were flown covering the eastern limb of the atoll from the reserve entrance up to Horsburgh Point and for an area around the East Point Plantation Settlement. The UAV survey flights were performed with a senseFly SODA camera mounted in a senseFly eBee Plus, imagery was recorded at a nominal resolution of 10cm per pixel, in total a distance of 105 km

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was flown. Overall for each flight the set of images have yielded high quality image maps, orthomosaics, and complimentary photogrammetrically derived digital surface models (DSMs).

The most significant problem the team encountered was with locating appropriate take off / landing sites as the high tides restricted the areas from which it was possible to launch and recover the drone and hence the area of the reserve which was accessible for us to survey with the drone. In addition, the failure of the flight software caused us to lose a day's flight time.

The team believes that the orthomosaics and DSM's generated from UAV imagery can provide a baseline map from which to measure change and have significant potential to map, quantify, and monitor plant species of interest, namely *Cocos nucifera* L. and *Casurina equisetifola* L. As well as locate bird roosts and record turtle tracks.

Future work

In order to complete the work developed during this expedition, future plant driven expeditions should aim to:

- complete ground truthing on Diego Garcia and the outer islands of the Chagos archipelago in order to complete the vegetation maps for the archipelago;
- map the full distribution of the native plant species and develop a National Red List for the archipelago;
- map the full distribution and develop a management strategy for introduced species on Diego Garcia.

Bibliography

Global Invasive Species Database (2019) Species profile: *Casuarina equisetifolia*. Downloaded from http://www.iucngisd.org/gisd/species.php?sc=365 on 07-02-2019.

Topp, J.M.W. (1998). An annotated check list of the Flora of Diego Garcia, British Indian Ocean. Atoll Research Bulletin. No. 313. Issued by the National Museum of Natural History Smithsonian Institution. Washington, D.C. USA. October 1998.

UKOTs Online Herbarium (2019). Facilitated by the Royal Botanic Gardens, Kew. Hamilton, M.A. and Barrios, S. (eds.). Published on the internet at http://brahmsonline.kew.org/UKOT (07 February 2019).

Whistler, W. Arthur (1996). Botanical Survey of Diego Garcia Chagos Archipelago, British Indian Ocean. Isle Botanica.

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

Photographic Supplement

The following photographs are a pictorial record of some of the daily field observations and collections made by the team in the field and other activities undertaken by them.

Figure 28. *Heliotropium foertherianum* and *Scaevola taccada*, two key species of the littoral hedge, along the northwest arm of Diego Garcia.

Figure 29. *Ipomoea pes-caprae* collected at East Point Settlement.

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Figure 30. Plant specimens before being pressed collected at East Point Settlement. All species are introduced plant species.

Figure 31. TW collecting fungi *Auricularia polytricha* (Auriculariaceae) at East Point Settlement. Collection number TW1.

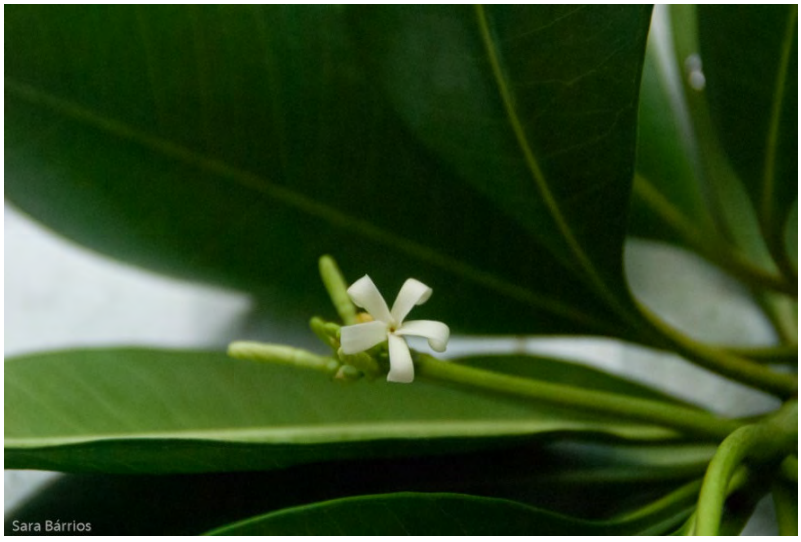

Figure 32. Flower of the native tree *Ochrosia oppositifolia*, collection number SB 283.

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Figure 33. Collecting fertile native *Asplenium macrophyllum*. Collection number SB 295.

Figure 34. Typical fern grove habitat in DG restricted Area. Dominant species, native *Asplenium nidus*.

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Figure 35. Detail of native *Aspenium nidus* spores. Spores collected for Millennium Seed Bank. Collection number SB 296.

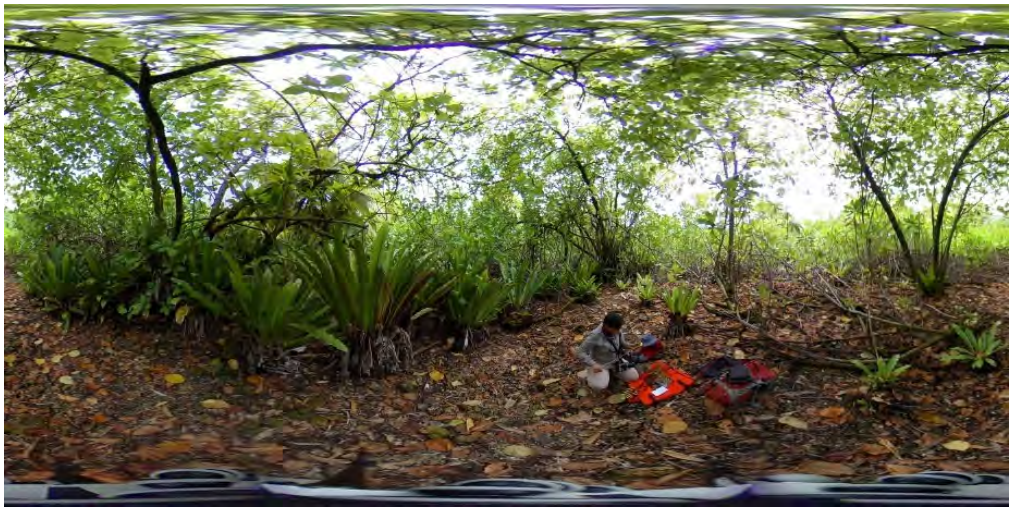

Figure 36. Fern grove habitat, capture with 360° camera Ricoh Theta V.

Figure 37. Old leper colony building at Point Marianne.

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Figure 38. MS with ancient Calophyllum inophyllum at Point Marianne.

Figure 39. HM using iNaturalist to record plant species at Point Marianne.

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Figure 40. Natural wetland area, surrounded by coconut palms (*Cocos nucifera*) and broadleaf vegetation, in the proximity of Point Marianne and airport runway.

Figure 41. *Leucaena leucocephala* (left) and *Casuarina equisetifolia* (right). Two introduced and potentially problematic invasive species recorded at the sea front at Point Marianne.

Figure 42. Hedge vegetation of Barachois Slyvaine. Native species present: *Cordia subcordata*, *Heliotropium foertherianum, Scaevola taccada and Suriana maritima.*

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

Figure 43. TW and SB present their work at a public lecture.

Figure 44. View from path reaching Barton Point, BIOT Plantation. Broadleaf forest with almost no evidence of coconut palm (*Cocos nucifera*).

Figure 45. Barton Point.

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

Figure 46. Red footed booby resting on native *Heliotropium foertherianum*, Barton Point.

Figure 47. Seedling of native Barringtonia asiatica at Barton Point.

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

Figure 48. Flowers of native *Barringtonia asiatica* at Barton Point.

Figure 49. Native *Hernandia sonora* tree, recorded at Barton Point.

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

Figure 50. Infructescence of native and locally rare *Achyranthes aspera* var. *velutina*, between Leconte Point and Rambler Bay.

Figure 51. Native vine *Cassytha filiformis* growing over other native vegetation.

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

Figure 52. Inflorescence (left) and leaves (right) of introduced and potentially invasive species *Bryophyllum pinnatum*. This species was recorded several times along BIOT plantation main path.

Figure 53. Sterile individual of native *Intsia bijuga*, observed along the path on BIOT Plantation.

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Figure 54. TW at the base of a native *Pisonia grandis*. The biggest trees of this species were recorded in the eastern part of the island.

Figure 55. Wetland area near Simpson point. All native ferns were recorded in this area, inclusive, *Asplenium longissmum* (right).

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Figure 56. Mature individual of native *Hernandia sonora*, the dominant tree on the broadleaf forests surrounding Simpson Point.

Figure 57. Leaves of native *Barringtonia asiatica*, recorded in coastal area.

Figure 58. Specimen of earthstar fungus *Astraeus hygrometricus*. Collection number TW8.

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Appendix 1: List of Botanical collections

Kew

British Indian Ocean Ter. material export list generated: 25/11/2018

Collection data					Material collection types and quantities			
Collector	Number	Date collected	Family	Species	Air dried sheets	Liquid preserved	Silica dried	Cleaned seed
Barrios, S.	274	14/11/2018	Orobanchaceae	*Striga asiatica (L.) Kuntze*	02	N	Y	N
Barrios, S.	275	14/11/2018	Passifloraceae	*Passiflora suberosa L.*	02	N	Y	N
Barrios, S.	276	15/11/2018	Convolvulaceae	*Ipomoea pes-caprae Roth*	02	N	Y	N
Barrios, S.	277	16/11/2018	Passifloraceae	*Turnera ulmifolia L.*	02	N	Y	N
Barrios, S.	278	16/11/2018	Amaryllidaceae	*Zephyranthes rosea Lindl.*	01	N	Y	N
Barrios, S.	279	16/11/2018	Rubiaceae	*Spermacoce assurgens Ruiz & Pav.*	02	N	Y	N
Barrios, S.	280	16/11/2018	Oxalidaceae	*Averrhoa bilimbi L.*	02	N	Y	N
Barrios, S.	281	16/11/2018	Urticaceae	*Pilea microphylla (L.) Liebm.*	02	N	Y	N
Barrios, S.	282	16/11/2018	Urticaceae	*Pipturus argenteus (G.Forst.) Wedd.*	02	N	Y	N
Barrios, S.	283	17/11/2018	Apocynaceae	*Ochrosia oppositifolia (Lam.)...*	02	N	Y	N
Barrios, S.	284	17/11/2018	Lamiaceae	*Premna obtusifolia R. Br.*	02	N	Y	N
Barrios, S.	285	17/11/2018	Convolvulaceae	*Ipomoea macrantha Roem. & Schult.*	02	N	Y	N
Barrios, S.	286	17/11/2018	Crassulaceae	*Crassulaceae (unknown)*	01	N	Y	N
Barrios, S.	287	17/11/2018	unknown	*Unknown*	02	N	Y	N
Barrios, S.	288	17/11/2018	Nyctaginaceae	*Boerhavia repens L.*	02	N	Y	N
Barrios, S.	289	17/11/2018	unknown	*Unknown*	02	N	Y	N
Barrios, S.	290	17/11/2018	Asteraceae	*Conyza canadensis (L.) Cronquist*	02	N	Y	N
Barrios, S.	291	17/11/2018	Malvaceae	*Triumfetta procumbens*	02	N	Y	N
Barrios, S.	292	17/11/2018	Orobanchaceae	*Buchnera hispida Buch.-Ham. ex...*	02	N	Y	N
Barrios, S.	293	17/11/2018	Leguminosae	*Leguminosae (Unknown)*	02	N	Y	N
Barrios, S.	294	19/11/2018	Aspleniaceae	*Asplenium macrophyllum Sw.*	02	N	Y	N
Barrios, S.	295	19/11/2018	Polypodiaceae	*Polypodiaceae (unknown)*	02	N	Y	N
Barrios, S.	296	19/11/2018	Aspleniaceae	*Asplenium nidus L.*	02	N	Y	Y
Barrios, S.	297	19/11/2018	Psilotaceae	*Psilotum nudum (L.) P.Beauv.*	02	N	Y	N
Barrios, S.	298	22/11/2018	Amaranthaceae	*Achyranthes aspera L. var. velutina...*	02	N	Y	N
Barrios, S.	299	23/11/2018	Aspleniaceae	*Asplenium macrophyllum Sw.*	01	N	Y	Y
Wilkinson, T.	1	14/11/2018	Polyporaceae	*Pycnoporus sanguineus*	01	N	N	N
Wilkinson, T.	2	16/11/2018	Auriculariaceae	*Auricularia polytricha*	01	N	N	N
Wilkinson, T.	3	16/11/2018	Agaricaceae	*Coprinus comatus*	01	N	N	N
Wilkinson, T.	4	16/11/2018	unknown	*Fungus4 (unknown)*	01	N	N	N
Wilkinson, T.	5	16/11/2018	unknown	*Fungus5 (unknown)*	01	N	N	N
Wilkinson, T.	6	16/11/2018	Polyporaceae	*Pycnoporus sanguineus*	01	N	N	N
Wilkinson, T.	7	24/11/2018	Unknown	*unknown*	01	N	N	N
Wilkinson, T.	8	24/11/2018	Diplocystaceae	*Astraeus hygrometricus*	01	N	N	N

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

Appendix 2: UAV initial outputs

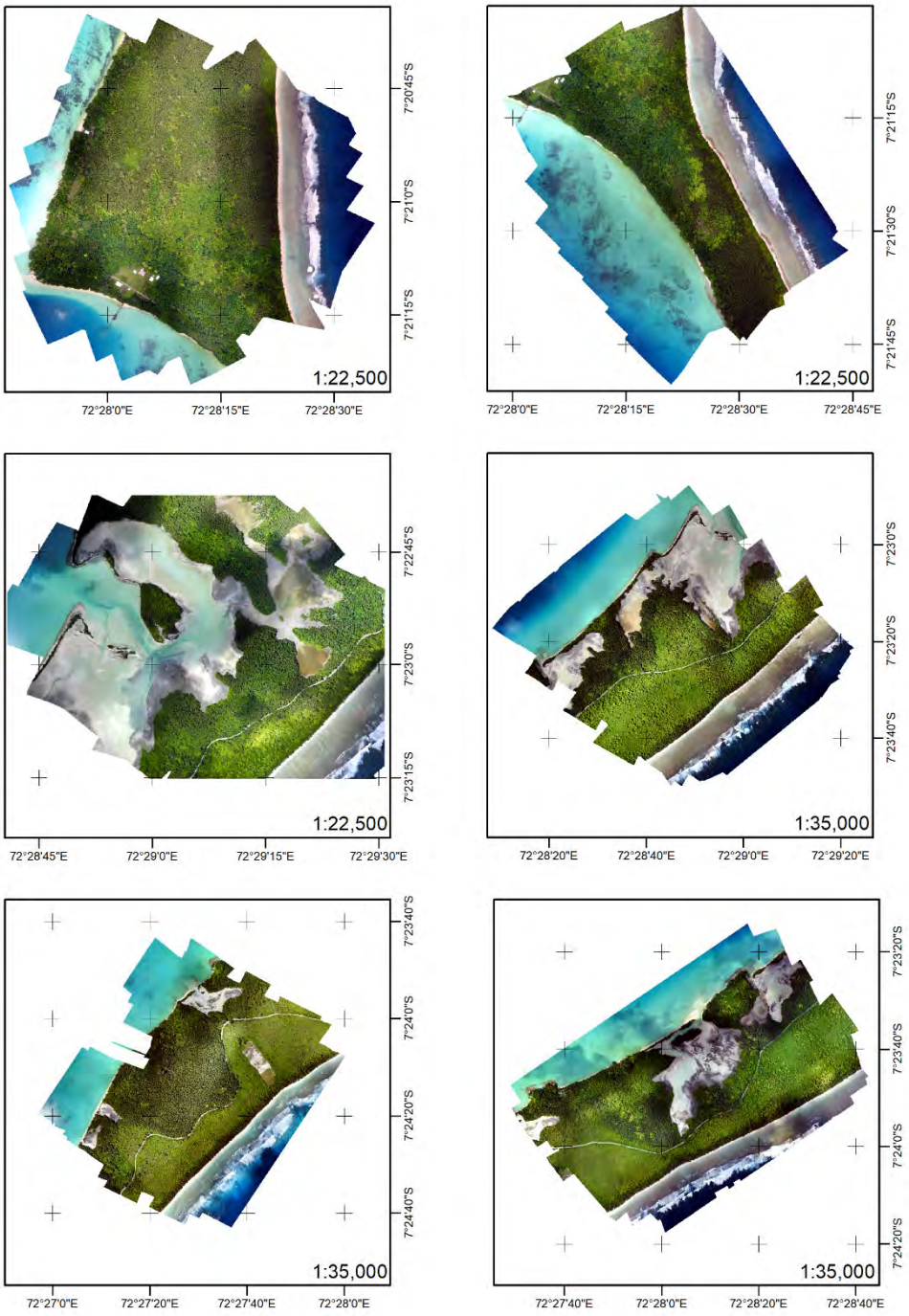

Figure 59. UAV derived orthomosaics.

Bárrios & Wilkinson (2018). *British Indian Ocean, Diego Garcia November 2018 fieldwork report, OFC* 893.

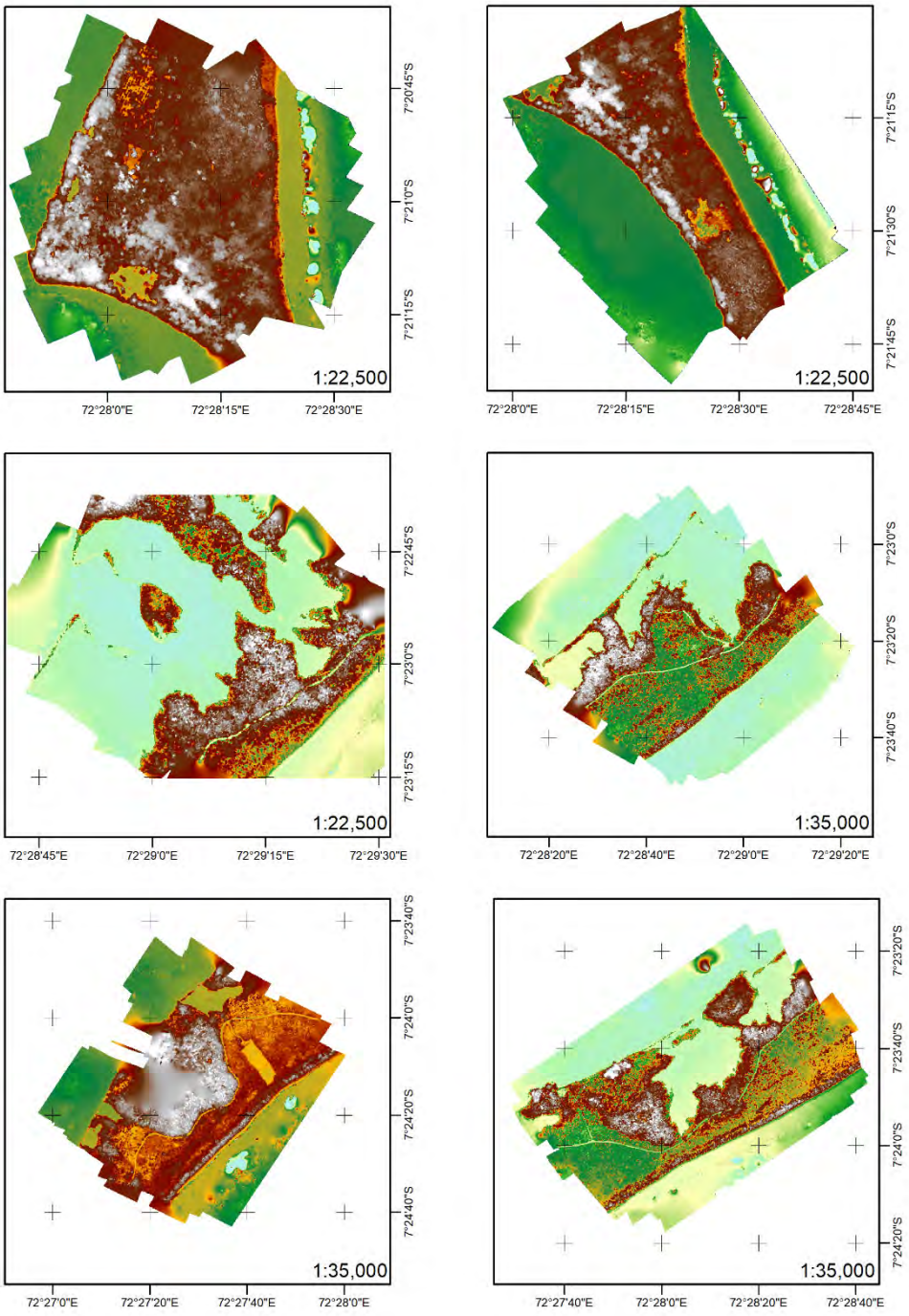

Figure 60. UAV derived digital surface models.