BIOT plastics and turtles project: summary of field activities in BIOT 2019

18 June – 3 July 2019

Cover picture: Team of volunteers from Diego Garcia clear rubbish from the beaches of the northern tip of Egmont atoll. Turtle nesting tracks and body pits visible. Credit: Nicole Esteban.

Project team

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With additional support from:

- Grampian Frontier officers and crew
- With support from volunteers from Diego Garcia (US and UK forces, and contractors)

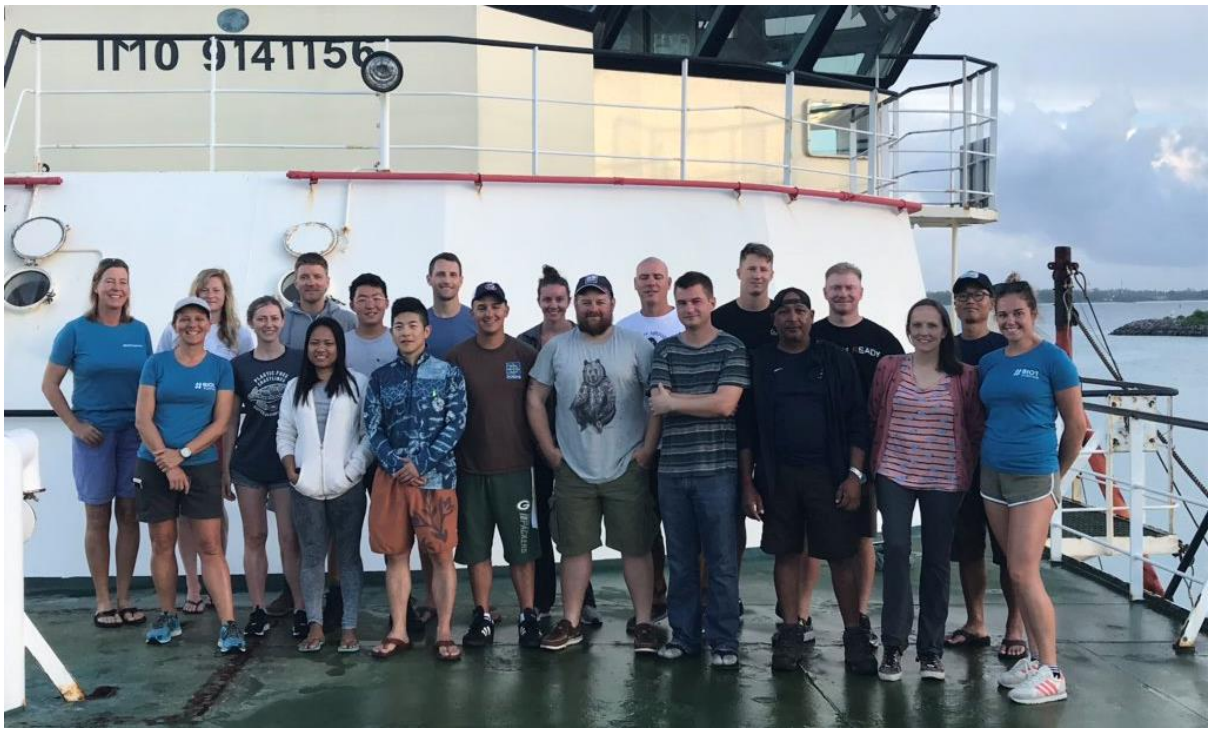

Photo: Project team with volunteers for Egmont beach clean-up weekend

Funded by:

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1. Introduction

This Darwin Plus-funded project started on 1st April 2019 and aims to reduce the negative impacts of plastic waste in the British Indian Ocean Territory (BIOT), with a focus on sea turtles, globally impacted by plastics. It will undertake a systematic analysis of how plastic arrives in BIOT, and how it is used and managed. This information will enable targeted beach cleans that benefit nesting green and hawksbill turtles, combined with a systems change approach to reduce single-use-plastic on Diego Garcia through alternative solutions based on reduction, reuse and recycling.

The project has three objectives:

I. Reduce the negative impacts of plastics on turtles in BIOT
II. Reduce the use of single-use plastic (SUP) on Diego Garcia (DG)
III. Provide alternatives options for reuse or recycling of plastic waste streams

2. June/July 2019 Expedition activities

The 2019 trip to BIOT was the first of three annual trips and sought to gather as much information on the current system as possible to enable the team to create a strategy that will meet the three main project objectives. At the heart of our project is the relationship between plastic waste on beaches and turtle reproduction, and most of our fieldwork was directed towards understanding patterns of turtle nesting activity, the physical conditions around the turtle nests and how plastic is distributed on, and through, nesting beaches.

This year's activities also focused on gathering information to enable us to begin understanding the system of SUP use in DG as it currently operates. This will help us identify barriers and challenges, as well as opportunities and priorities for change, allowing us to direct efforts and actions where they can be most effective.

Finally, we worked to understand the size and composition of plastic waste streams – both DG-generated and that collected from beaches across BIOT - in order to be able to make recommendations for re-use and recycling.

3. Methodology

Objective 1 - Monitoring effects of plastics on sea turtles

- Turtle nesting surveys

Turtle nesting surveys are routinely conducted on Index Beach, on the eastern arm of DG atoll at 2-3 weekly intervals by Nestor Guzman of in the Public Works Department as part of the Bertarelli Programme in Marine Science (BPMS). During this expedition, we conducted two surveys of Index Beach to supplement the data capture by including reporting of turtle excavations that are impeded by presence of plastic. The surveyor examines partially excavated chambers and reports how many have obstructions of plastic.

On Egmont Atoll, nesting surveys were conducted along four beaches prior to the beach clean-up.

- Temperature loggers

We installed temperature loggers at two sites on Index beach for the monitoring of incubation temperature at turtle nest sites. At each site, six temperature loggers are buried at two stations: shaded and unshaded. To cover the depth range of hawksbill and green turtle nests, loggers are buried at 30, 50, 70cm depths at each station. The loggers buried in July 2018 were excavated. Unfortunately, three were missing and potentially excavated by turtles and washed away at high tide. We selected two new sites nearby and redeployed 12 new temperature loggers.

- Sand cores

To assess presence of microplastics in the sand column above turtle nests, PVC pipes were hammered vertically into the sand to a depth of 60cm (Fig 1) at three locations along Index Beach. Sand cores were shipped to Swansea University from DG in three packages. Unfortunately, two packages have not yet arrived. The analysis of sand in cores will take place in the coming year as the samples did not arrive in time for processing and analysis by MSc student Katherine Jones (who completed work on cores from Salomon and Egmont Atolls sampled in March 2019).

Figure 1. a. PVC tube for collecting sand column b. Driving the tube down into the sand c. Fully buried tube ready for retrieval

- Assessing distribution, composition and source of beach debris across the archipelago

Two contrasting methods were used to assess the composition of in-situ beach waste debris. The objective was to conduct a methods comparison to identify differences in results between the two methods and determine which was the more useful approach.

1) Marine Debris Tracker (MDT) transects

Surface debris on beaches was recorded using the NOAA list on the MDT app along a series of 100m transects, at 400m intervals on both DG and Egmont Atolls. The transect was bounded on one side by the strandline and on the other by the vegetation line with items recorded up to 1m beyond that line.

Using these methods, Index Beach on DG was surveyed for surface debris distribution on 25.06.2019; and beaches in the Sudest (South) and Lubine (North) island complexes of Egmont Atoll were surveyed on both lagoon and seaward sides on 29.06.2019.

Every piece of debris encountered was recorded within the transect.

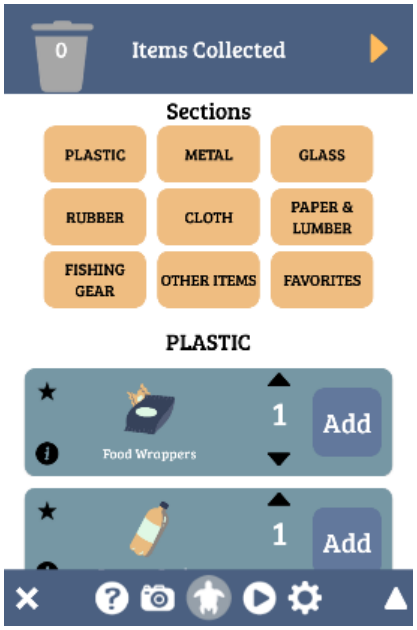

Figure 2. (right) Screenshot of MDT app on mobile phone showing the different categorisations of debris which can be reported.

2) Photo quadrat surveys

Photo quadrat surveys were carried out on Index beach (DG) and across Egmont Atoll (both Sudest and Lubine Island complexes, seaward and lagoon sides) in June 2019. The plots covered 100m^2, ideally 10m x 10m but this varied depending on the beach. For each plot, the longitude and latitude were recorded for all corners of the plot and photos taken of the full plot. Between one and five plots were completed per beach with 20 50cm x 50cm quadrats thrown randomly within it and photographed.

Figure 3. Example of how photoquadrat data were collected. Quadrats are thrown randomly, photos taken are then analysed to record any debris found within them

The data from these photos and from surveys completed in the northern atolls were combined for analysis to identify beaches with the highest density of marine debris by zone (seaward/lagoon) and atoll, and to quantify the frequency of different types of debris. These analyses were completed by an MSc student at Swansea University.

- Beach clean

The project team and a group of 20 volunteers from DG spent the weekend of the 29/30 June at Egmont Atoll (based on the British Patrol Vessel Grampian Frontier). The aim was to identify an area of beach with a high density of turtle nesting activity and to remove beach debris from in and around the nest sites, bringing it back to DG. We then plan follow up surveys to look at the rate of plastic accumulation on this beach using MDT transects conducted by the EO.

Beaches on the seaward and lagoon sides of both island complexes (Sudest in the south and Lubine in the North) were surveyed for surface debris (see methods above) and for turtle nesting activity. These surveys identified the north west tip of Lubine Island as the most suitable site for the planned beach clean as it had a high density of beach debris, extensive turtle nesting activity and easy access from daughter craft to shore. The team spent approximately four hours on 30 June collecting debris from beaches on both sides of the island and around the sand spit at the northern tip between the strandline and up to 2m into the vegetation. All waste (excluding glass, sharp, particularly heavy, or potentially dangerous items) was collected in 50 litre reusable sacks; which were loaded onto the daughter craft when full and ferried back to the BPV.

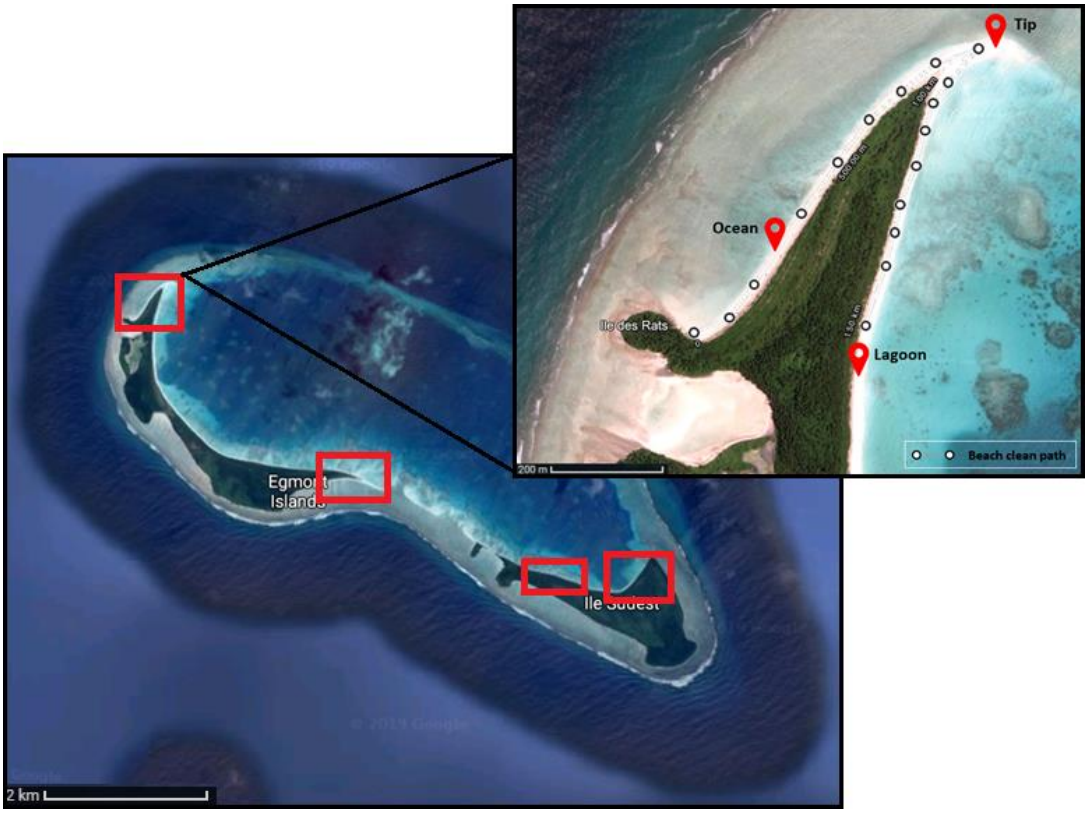

Figure 4. Map of Egmont Atoll with locations of surveys carried out highlighted in red on both islands. The close-up image of the northern tip indicates the area covered by the beach clean

During the beach clean all plastic water bottles collected were specifically counted and their countries of origin or manufacturer/brand recorded wherever possible. These bottles were then added to the other beach waste in the reusable sacks and removed from the island.

Objective 2 - Reduce the use of single-use plastic (SUP) on Diego Garcia

The team's objective was to understand the current system of SUP use on DG as well as relevant issues such as the availability of drinking water and refill points. The work aimed to describe both the physical infrastructure as well as attitudes to issues such as beach waste, ocean health and plastic recycling using both qualitative and quantitative methods.

- Physical map of water drinking water infrastructure in downtown DG

As part of the data collection to help inform the systems diagnosis under objective 2, we recorded the different drinking water access points in downtown DG, including the white water bowsers, water coolers found in offices, drinking water fountains and outdoor taps. We also noted where potential communication points are (e.g. bus stops, noticeboards, TV screens) that could be useful for future campaign activity.

- Stakeholder interviews

Semi-structured interviews lasting between 30 and 60 minutes were conducted with a range of key personnel on DG. During the June expedition, five people were interviewed, subsequently followed by a further two after the expedition by the EOs. Interviewees represented decision makers and senior managers from various DG departments.

The interviews covered the following questions:

- Can you describe your role and responsibilities in the DG system? for example, retailing, waste management of plastics, decision-making, procurement etc
- What problems do you associate with SUPs in BIOT?
- How, if at all, are you trying to address these problems you've identified?
- What do you think are the challenges with addressing the SUPs problem(s) you've identified?
- What would enable DG to become SUP free?
- What do you see as the drivers / factors/ key people influencing SUPs in DG?
- How do you communicate and engage with your teams? For example, entry points such as inductions / briefings / trainings, etc. Do you ever communicate environmental issues to your teams?
- Would you be interested in contributing / collaborating towards action / experiments to tackle SUP related challenges?

- Focus group discussion

A focus group discussion was held in the Island Rooms following the project presentation given the previous afternoon on 24th June. Eight military personnel attended with three of the project team running the session, which lasted for 50 minutes. The discussion focused on three areas of interest; the ocean and plastic pollution, SUP use on DG, and barriers and actions for making DG SUP-free. The group was made up of young and engaged individuals who have all previously been involved in the turtle volunteering opportunities on DG and have also seen pollution in the ocean or on beaches.

They discussed a mixture of bottom-up and top-down options for how to make DG SUP free but all agreed it would be possible to achieve. We also discussed what communication opportunities there are on DG that we could use during our planned behaviour change campaign in 2020/2021. Suggestions included the island indoctrination sessions, new DG welcome pack, all hands email, social media (Facebook), 'plan of the week' and monthly printed calendar of events.

- Behaviour survey

The project aims to conduct a survey to understand people's behaviour and use of SUP items on DG over the course of the project, with the initial survey conducted in 2019 and follow up survey in 2021. In order to design a questionnaire that works across a range of different demographics we carried out a pilot questionnaire consisting of three sections with 13 questions in total (demographics, turtles and the ocean, and SUP-use on Diego Garcia) (see Appendix I).

Questionnaires were printed and completed in person at different locations to ensure we collected data from a variety of DG residents. The main locations included the food court, the contractor food hall, at our presentations (Island Rooms and at the FilMau club), and the NGIS accommodation reception.

- Presentations and engagement

The project team gave two presentations directly on the plastics work (in the Island room to all hands and in the FilMau club) and the presentation by the turtle team in the Chapel also referenced the crossover work between these two teams.

- Mapping the system of current SUP use on Diego Garcia (DG)

To understand the current system of SUPs on DG, project partner, Forum for the Future (FFTF) is conducting a systems-diagnosis, using both data collected during the June 2019 trip, and subsequent data collected via the Environment Officer on DG between July 2019 and January 2020.

The diagnosis will record, analyse and map out the composition and flow of disposable plastics through DG, identifying key items, procurement routes, retail and usage patterns, sources and rates of disposal, and sorting of waste. This work will inform the next phase of the project, which will involve:

- A plastic reduction strategy for DG
- A behaviour change campaign to reduce the use of single-use plastic water bottles on DG and instead encourage a new culture of reusing and refilling, following ZSL's #OneLess model.

Key data types feeding into the diagnosis are:

- Stakeholder interviews
- Behaviour surveys
- Physical map of downtown DG
- Procurement information

Using this information, FFTF has begun to map the dynamics of two interconnected systems – beach plastic and island-generated plastic.

Objective 3 - Provide alternatives options for reuse or recycling of plastic waste streams

In order to understand what options are available for further processing of plastic was in BIOT it is first necessary to describe the specific materials in the waste streams and their relative proportion to the total. This data was collected by sampling the beach waste pile on DG and combining those results with beach waste data from the other atolls collected in situ. By identifying common items in this waste stream, we can describe the materials they are made from and their suitability for various forms of re-use or recycling.

Figure 5. Beach waste pile on DG with indication of location of sub-samples. Sampling concentrated on the end of the pile with 6 subsamples, averaging 10.5kg, taken along the length of the pile.

Each sample was sorted into categories, describing the broad ‘item type’ (e.g. bottle, flip-flop, fragment) and the frequency with which each category occurred.

The total volume of the waste pile will be estimated using a photogrammetry technique (3-d imaging). Images for this analysis were gathered by flying a drone along the length of the waste pile in overlapping tracks. The images from each track will be stitched together to form one 3-d image which in turn can be quantified by volume. The total volume and the proportion each category forms of that total will provide reasonable estimates of the volume of each constituent plastic type available for recycling.

An important dataset we require to complete this part of the analysis is the volume of plastic coming through the procurement channels into the facility on DG. This information should be available and the team is currently enquiring about our access to this. There are two main ‘markets’ for incoming plastic; retail outlets such as the Ships Store and leisure outlets including food and drink sale points and vending machines managed by MWR/KBR.

4. Results

Objective 1

- Turtle nesting surveys

We completed two nesting surveys on Index Beach and nesting surveys on four beaches of Egmont Atoll. The results show a high number of green turtles nesting in both locations. A preliminary comparison of data with previous data from DG shows fairly consistent nesting density between years. We have no previous records from Egmont Islands during this season.

- Temperature loggers

The data have been downloaded and checked for consistency. The nine loggers that were recovered operated throughout the 12 month period. Data analysis will be underway in the coming year.

- Sand cores

Analysis of cores will take place during the coming year at Swansea University.

- Beach surveys of surface plastics using the Marine Debris Tracker (MDT) app

In total, 14,261 items of debris were recorded using the MDT app by the project team.

7,256 items of debris were logged on Index Beach on 25 June. Of these, 87% of the items were plastic (n=6,332).

7,005 items of debris were logged on Egmont Atoll on 29 June. Of these, 82% of the items were plastic (n=5,717).

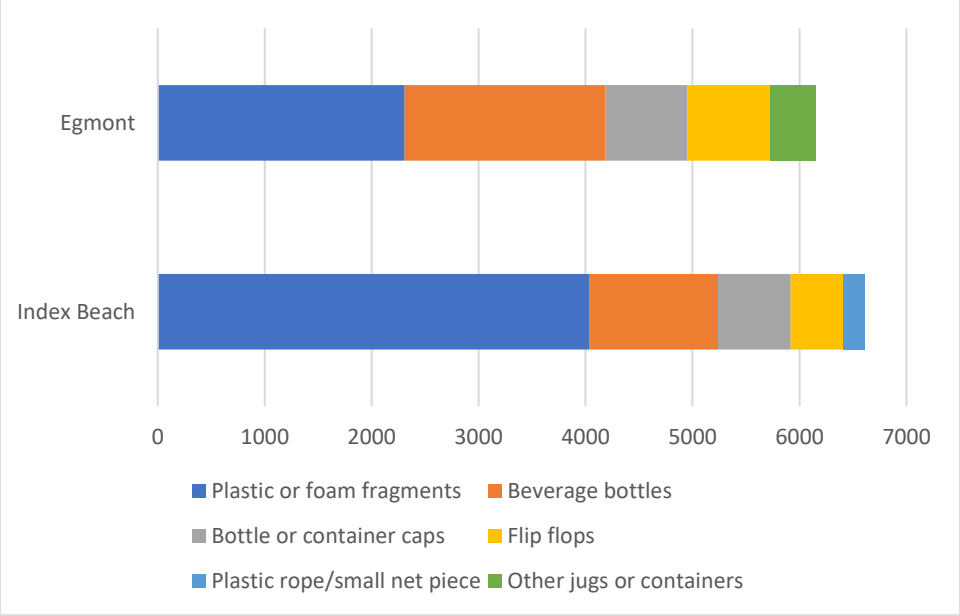

Figure 6. Top five plastic items (by count) on Egmont Atoll and Index Beach

These data are now being combined with data collected in the northern atolls in March 2019 and further, in-depth analysis is underway. In addition, a further dataset of beach debris collected in DG and other atolls in 2009 by Peter Carr has now been made available for analysis which could make an interesting comparison – providing at least point in time observations from a decade ago.

- Photo quadrat surveys

We carried out a total of 11 x 100m^2 plots of photo quadrat surveys on both DG and Egmont Atoll. These data have been combined with data collected from other atolls in March on the Vava II expedition and further analysis is now underway. The dataset represents a good geographical coverage of islands across the archipelago and should yield interesting results on the spatial distributions of waste.

- Beach clean

A total of 50 x 200 litre capacity bags were filled with beach waste (predominantly plastic) and transferred by daughter craft back to the BPV. Items varied in size from a 2.5m polystyrene foam cylinder to plastic fragments a few millimetres across. The waste was added to the waste pile at the waste management facility on DG, and the bags used to transport the waste were stored for future re-use.

Objective 2

- Stakeholder interviews

The respondents revealed a wide range of attitudes to the issues, sometimes contradictory ones; for example, there was disagreement over whether compulsory (e.g. legislative) or voluntary changes to behaviour are most effective or over the level to which DG resources should be used to clear up 'other peoples' waste on the beaches. It is clear that the issue had some visibility due to recent comments from the US Commander about the reduction in free plastic cutlery being given out with take-away food being a welcome development. The MWR/KBR team led by Lavonne Washburn was particularly engaged with reductions in SUP use and encouraging the use of drinking water by provision of water fountains and bottle refill points – engaging with this team will be a key part of the strategy to encourage this behaviour.

The Britrep was very supportive of the project and initiatives to reduce plastic waste overall and had good ideas around the introduction of 'culture changes' towards the use of refillable bottles/drinking water into the indoctrination process when new personnel arrive on DG. She was also very supportive of including beach cleans into the British Forces routine activities which could make a major contribution to the effort spent on this activity.

- Physical map of downtown DG

In downtown DG, we identified 14 white water bowsers, 14 watercoolers (primarily in offices), five drinking fountains (found in the gym and sports centre) and three public taps. It is likely there are more waterpoints available in the offices which we didn't have access to visit. These data could be developed to inform where additional infrastructure may be required or useful.

- Behaviour surveys

A total of 43 residents completed the pilot survey with 51% military personnel, 44% contractor and 5% as 'other', consisting of one person from the Department of Defence and one person from the United Seamen's Service. As expected, the majority of military personnel were American (77%) whilst the majority of contractors who completed the survey were Filipino (79%).

Some initial findings of interest show the most popular source of everyday drinking water was the water cooler (50% of respondents use them every day), followed by tap water (40%), and bottled water (38%) (see figure 7). The main reason given for not drinking tap water was due to a dislike of the taste of the water (see figure 8). 53% of respondents who said they use a refillable bottle every day whilst 20% said they never use them.

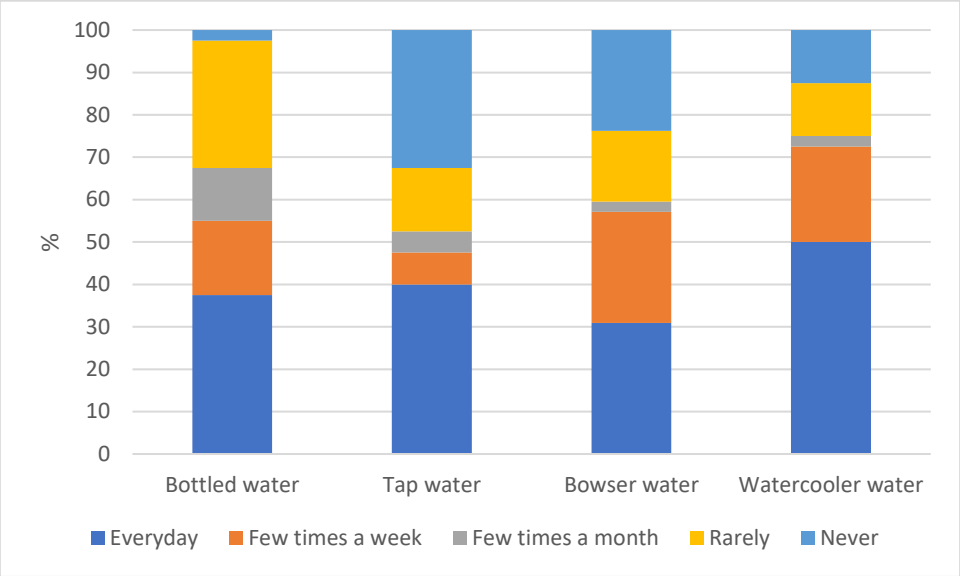

Figure 7. Frequency of use of the different drinking water options as a percentage of respondents

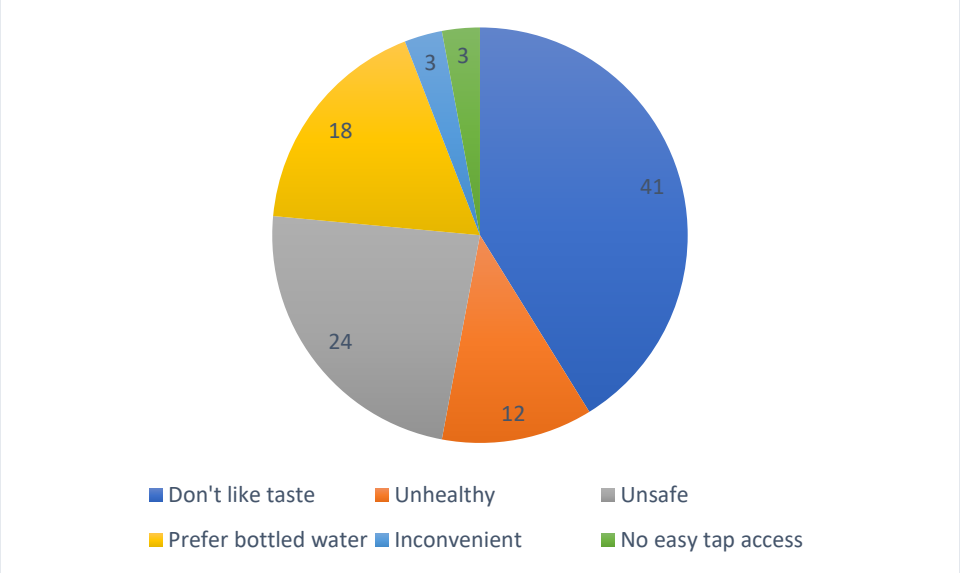

Figure 8. Reasons given for not drinking DG tap water as a percentage of the respondents who answered this question

These results gave us a good indication of which questions worked well, and those which did not, and this will be used to inform the final questionnaire which we hope to roll out before the end of this year. The results this year have potential bias due to many the responses coming from those who attended the talks and hence are already interested in and/or aware of the issue of plastics.

- Preliminary system mapping

Following a preliminary analysis of the data collected during the expedition (as outlined in the methods section), Forum for the Future (FFTF) produced a draft system diagnosis map, highlighting the current dynamics of the system.

Based on this preliminary analysis, three key behaviour shifts that are required for change to happen have been identified by FFTF: not buying SUPs, drinking tap water and connecting people to the ocean. FFTF's current assumption is that by creating interventions which seek to normalise desirable behaviour patterns, they will create the wider case for change on marine plastic in marine protected areas, as well as develop a prototype of a closed loop island system.

This initial work is now being reviewed by the project team, with further working sessions planned with FFTF in October 2019.

Objective 3

An analysis of data from beach clean waste across all atolls will compare distributions and compositions spatially and temporally and this work is currently underway by Swansea MSc student Victoria Hoare.

A total of 1,771 items from the beach waste pile on DG were categorised and recorded. Of this total 1,374 items (78%) fell into three categories; plastics bottles, polystyrene and flip flops. In general terms the majority of the drinks bottles will be made from the polymer polyethylene terephthalate (PET) with a minority made from Polypropylene (PP) or high-density polyethylene (HDPE). Flip flops are made of a combination of a foam rubber sole, commonly ethylene-vinyl acetate (EVA), and a toe thong often made from polyvinyl chloride (PVC). Further analysis of the specific material make-up of these main items will be undertaken going forward to develop further understanding of the composition.

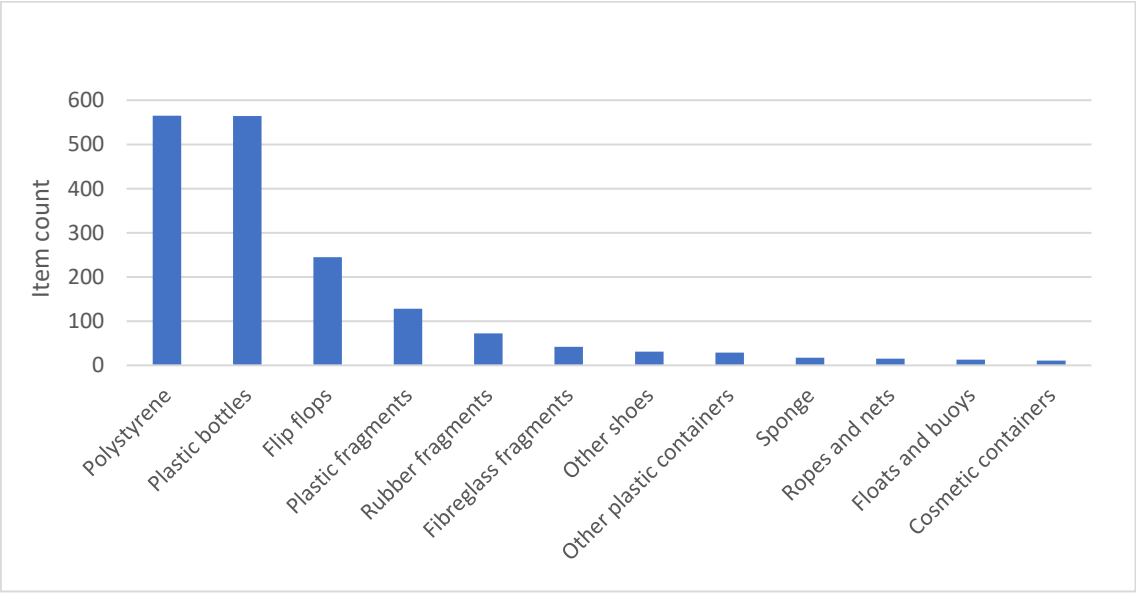

Figure 9. 12 item categories most frequently recorded from the DG waste pile sample

- Analysis of marine debris on beaches

Preliminary analysis of data collected during the photo quadrat survey and the Marine Debris Tracker survey show that the two atolls with the great amount of beach debris were in the north of BIOT in Peros Banhos and Salomon Islands. Plastic was consistently the main material type recorded using both methods though the proportions varied slightly between the two methods. Further analysis of survey results and a comparison of the two different methods will take place in the coming year to develop a peer-reviewed manuscript.

- Egmont – recording water bottles by country

A total of 804 plastic water bottles were identified, categorised and recorded during the beach clean. Of these, 383 were unidentifiable in terms of origin (no label or label unreadable). A further 18 were branded but subsequent research has been unable to identify the brand country of origin.

The brands and country origin of 403 bottles (approximately 50%) were identifiable by their labels. A total of 17 different countries of origin were recorded. The top five countries made up 88% (n=354) of the categorised bottles (n=403).

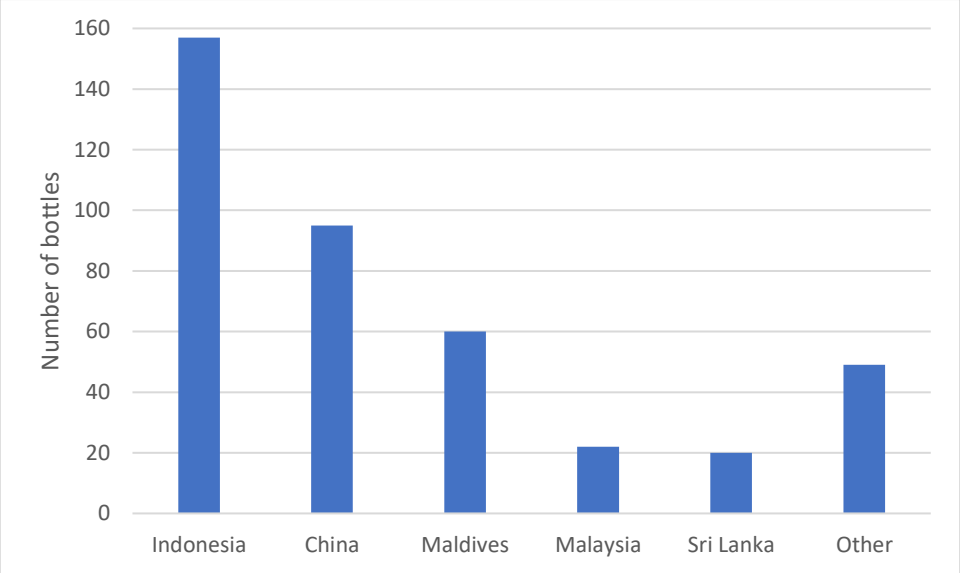

Figure 10. The top five countries and their number of identified bottles recorded during beach clean

The most predominant brand of bottled water recorded was by far 'Danone Aqua', an Indonesian brand, which accounted for 33% (n=132) of all the categorised bottles.

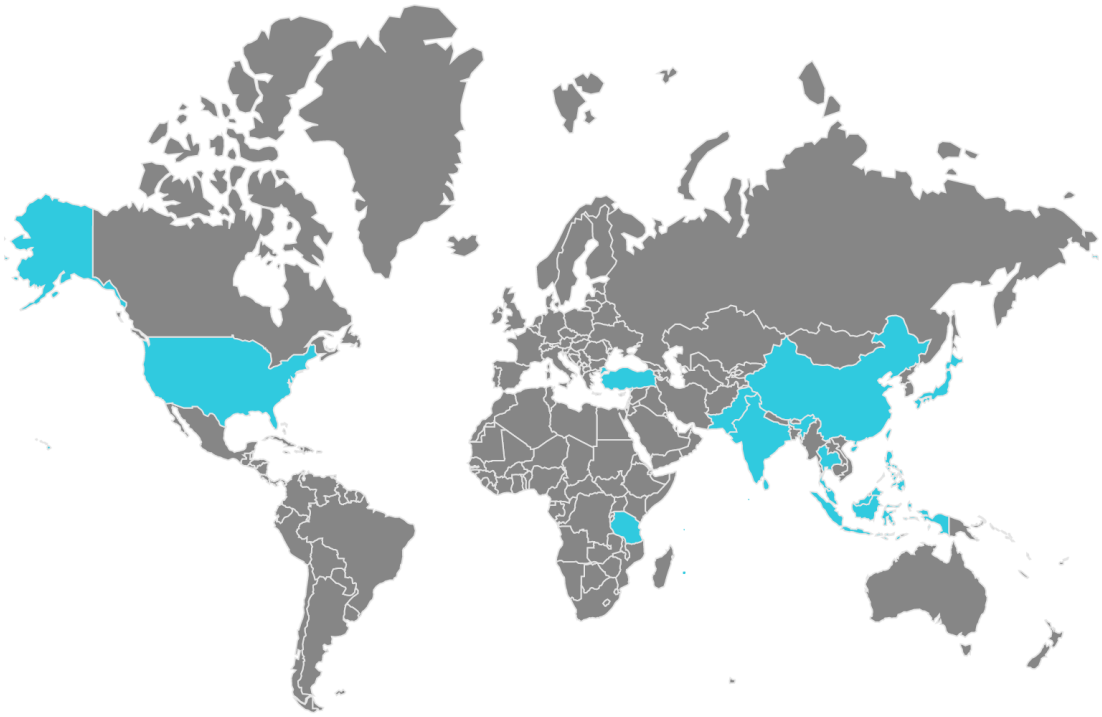

Figure 11. Countries identified from bottles collected on the Egmont beach clean highlighted in blue.

Additional activity since trip

We have received good support for the adopt a beach program and it is currently being rolled out. Each Tenant Command is adopting up to 2km stretch of Oceanside coast, the aim is to do one beach clean very two months. It will be important to record the duration of each clean and the number of people in each team going forward in order to quantify the level of effort going into this activity.

There are on-going changes to the way SUP plastics are offered at retail and leisure outlets

- The phasing out of plastic straws and SUP in the restaurants and shops (being replaced by paper, wood or biodegradable plastics).
- The CDF galley (7 degrees south) are looking to reduce polystyrene take out boxes by 70-80% by introducing reusable metal 'tiffins', as already used by the BOSC galley. It will be important to access records that quantify this change as it potentially a very significant and positive switch.
- The Ship's Store has completely phased out Styrofoam plates and they have been replaced by paper plates.
- Plastic cups are still currently being bought in, but paper alternatives have been introduced.
- Wooden alternatives to plastic cutlery are also now available.
- The refillable bottles have been moved next to the bottled water. Procurement of cheaper versions of the refillable bottles are being researched as the current price point is over $30.
- Further review of unnecessary SUP is also under review, for example changing 6 packs of beers and soft drinks to 12 packs as the latter are packed in cardboard boxes rather than plastic rings (like the 6 packs). They are also phasing out slow sellers of soft drinks that come in plastic bottles.

The team noted that unneeded plastic cutlery is still being included with some takeaway orders; so the move away from this needs to be continued through encouragement and staff training.

The substitution of 'bio-degradable' plastics needs to be more carefully considered – this will only be useful change if these items are sorted from the waste stream and treated separately (i.e. not incinerated). They will not all be suitable for landfill either – some will require aerobic conditions to degrade – and in the absence of an industrial digester that can achieve temperatures of 50^{o}C and higher required to break down some of these materials their use can not necessarily be seen as a solution.

US Commanding Officer ((CO) Capt. Tornga) is very supportive of initiatives to both reduce SUP on Island and promote regular beach cleans. Each CO signs an Environmental/Energy Conservation Policy. Capt. Tornga has updated the policy to include the following commitment:

'We will collaborate with the BIOT Administration to continue to seek to reduce the use of single use plastic items and where practicable provide alternatives or replace such items with recyclable options. We will continue to commit to regular beach clean-ups to remove plastics and enhance nesting turtle habitats'

The policy is distributed Island wide and is on the back of accommodation doors though it may be subject to further revision. It is a very welcome commitment to the objectives of this project and we are extremely encouraged by the support shown.

A presentation was given at a Tenant Command meeting to garner support for the 'Adopt a Beach' programme.

5. Conclusions and next steps

- Understanding flows of plastic in space and time

Understanding where plastic waste is from, how it moves into BIOT from the rest of the Indian Ocean and how it is subsequently distributed across islands is an important next step in the project. By combining these data with turtle nesting surveys made across the archipelago and throughout the year the project will build a picture of the most effective mitigation techniques. There is also potential to develop this work further by using oceanographic modelling techniques that track particle movement and we are developing this idea with colleagues at MRAG.

A 12 month experiment to test effects of microplastics on incubation conditions will be set up on the Index Beach during the planned turtle expedition in November 2019.

- On-going monitoring on Egmont by SFPO

We have requested that the SFPO undertakes ongoing monitoring of the Egmont beach that was cleaned during the expedition so that we can determine the effectiveness of beach clean ups. The team has met with a Blue Belt team recently conducting beach cleans on the remote Henderson Island in Pitcairn – they have attempted to use a camera trap to record the rate of return of plastic on the beaches there and this is technology that might work well in BIOT where camera traps are already in use for recording turtle nesting activity.

- Use Forum For The Future (FFTF) work to describe system and identify points of change

The initial systems diagnosis by FFTF describes the status quo in terms of single-use plastic on DG. The crucial next steps will involve further analysis and interrogation by FTFF and the project team together to reveal priority actions areas, barriers to change, and opportunities for interventions to overcome them. This will in turn inform the development and implementation of both the SUP reduction proposals for DG, and the planned behaviour change campaign (2020 – 2021) to significantly reduce the use of single-use plastics on DG and create a greater appreciation of the effects of plastic on ocean health amongst those living and working on DG.

- Timing for roll out of main survey

The pilot survey we conducted in June has allowed us to refine our questions and version two is now in development. The objective is to distribute this final version to as many people on DG as possible across all communities by the end of 2019. This will enable us to capture the views and behaviours of the population there as it is now and provide a baseline against which we can compare change in year 3 of the project (post campaign).

- Potential timing of trips next year

The team would like to be able to repeat the beach cleaning activity with volunteers in 2020. Identifying suitable locations will depend in part on analysis underway at the moment. The analysis underway at Swansea University will suggest optimum beach clean timings based on the distribution of beach waste temporally and spatially and on turtle nesting season. This does not take into account other considerations such as weather, fuel costs or the availability of volunteers. The trip this year did highlight the difficulty in involving contractor staff in activities away from DG due mainly to their limited time off and some reservations about insurance cover for voluntary activities. The latter issue can be addressed by temporarily registering these people as ZSL volunteers for the duration of the work which would provide them with insurance cover. The former issue is harder to

get around and may be impossible for all but a small number of personnel. The importance of raising awareness among the contractor staff for the value of ocean health in BIOT and the need to reduce plastic consumption, for this reason DG based activities that can engage staff in short focused activities that fit around their other commitments should be considered in 2020 – possibly in addition to beach cleans on other atolls.

A possible date for DG based activities next year is the International Coastal Clean Up Day on the 15th September. This is a global initiative with good participation in the Philippines and could provide a useful focal point around which to raise awareness of the issues of ocean plastics.

Acknowledgements

Many thanks to the Britrep and XOs (both incoming and outgoing) and British forces for support and practical help. The team is particularly grateful to all those who gave us their time, from volunteers to pilot survey respondents and interview subjects. Special thanks to the SFPO and crew of the Grampian Frontier who made our weekend on Egmont so successful and enjoyable.

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Appendix I. Pilot questionnaire

Plastic and sea turtle project

Research questionnaire for Diego Garcia residents

We kindly ask you to participate in this research questionnaire to help us understand what kinds of plastic are currently used on Diego Garcia. This information will inform our plastic and sea turtle research project.

There are no right or wrong answers here – we are just interested your opinions!

All responses will remain anonymous.

To help us with our research we firstly need some information about you. (All answers are anonymous and information will only be used for scientific research purposes).

1. Are you:

☐ A contractor ☐ Military personnel ☐ Other (please specify?).....

2. What is your nationality?.....

3. How long have you lived on DG?

☐ Less than 1 month ☐ 1 month – 6 months ☐ 6 months - 1 year
☐ 1 year – 3 years ☐ 4 years - 10 years ☐ 10 years +

4. Which age category are you?

☐ 18-24 years old ☐ 25-34 years old ☐ 35-44 years old
☐ 45-54 years old ☐ 55-64 years old ☐ 65 years or older

Turtles and the ocean

5. On a scale of 1 – 10, how important do you think DG is for sea turtles?

Please check one

1	2	3	4	5	6	7	8	9	10	*Don't know*

<- not important *very important ->*

6. Please write down 3 words that you associate with the ocean:

1)..... 2)..... 3).....

Plastic use on Diego Garcia

7. Which single-use plastic items do you <u>personally</u> use?

Item	***How often? (please tick one)***				
	Everyday	A few times a week	A few times a month	Rarely	Never
Plastic bottled water					
Other plastic bottled beverages (e.g. Coca Cola)					
Plastic bags					
Plastic straws					
Plastic drink stirrers					
Plastic cutlery, cups & plates (picnic items)					
Plastic take-away food boxes					
Plastic lids on take-away drinks (eg coffee)					
Any others? (please specify)					

8. What kind of water do you drink on Diego Garcia?

	How often? (please tick one)				
	Everyday	A few times a week	A few times a month	Rarely	Never
Plastic bottled water					
Faucet /tap water					
Water from the white water tanks (bowsers)					
Water from office coolers					
Any others? (please specify) ……					

9. If you buy plastic bottled water, how many bottles do you buy on average per week?

……

10. If you do not drink tap water on Diego Garcia, please indicate the reasons why:

CHECK ALL THAT APPLY

☐ I don't like the taste ☐ I think it's unhealthy

☐ I think it's unsafe ☐ I prefer bottled water

☐ It's inconvenient ☐ I don't have easy access to tap water

☐ Any other reasons? (please specify):

……

11. Do you use a refillable water bottle on Diego Garcia?

CHECK ALL THAT APPLY

☐ Yes – every day ☐ Yes – quite often, but not every day

☐ Yes – but very rarely ☐ No – I own one but do not use it

☐ No – I do not own a refillable bottle

☐ Any other reasons? (please specify):

……

12. Do you participate in any of the following activities?

CHECK ALL THAT APPLY

☐ Swimming in the ocean ☐ Snorkelling

☐ Windsurfing ☐ Leisure time on the beaches

☐ Fishing ☐ Turtle volunteering

☐ Beach clean-up volunteering ☐ Any other ocean / beach activities? (please specify):

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13. If you have any further comments, please feel free to share them here:

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Thank you!

Please return the completed questionnaire to a member of the ZSL science team, or to the Environment Officer, BIOT HQ (British Forces).

If you have any questions or would like any further information, please email us BIOT.Science@zsl.org