

Chumbe Beach Clean Up Events

Report



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1. Introduction

Even though Chumbe Island has pretty much eliminated single-use plastics from its ecotourism operations, the private island off the West coast of Zanzibar is subject to marine litter being washed up on its shores in different quantities and compositions, depending on the seasonal winds, currents, and other influencing factors. Chumbe's rangers regularly clean the main tourism beach from marine litter and sort and discard of the waste appropriately.

However, in order to gain a deeper understanding of the marine litter problematic and to see how much litter the ocean currents are bringing to the island, where the hotspots of accumulation are, as well as composition and origin of the litter, regular scientific Beach Clean Ups are organised by volunteers and rangers. This report summarizes four Beach Clean Ups conducted between March and August 2022 by a team of volunteers from the Deutsch Tansanische Partnerschaft (DTP e.V.).

2. Data Collection (methodology)

From March to August 2022 the Chumbe Volunteer-Team conducted four Beach Clean Up Events in close collaboration with the island staff.

For these Clean Up Events, the Chumbe Clean Up team worked with a regionally tested systematic method of collecting and recording washed up marine litter, as well as designed a new adapted datasheet to enter all collected data, which the team can continue to add over time.

The method involves buddy teams who are collecting and recording litter along pre-defined transects (see Fig 1 and Table 1.). Beside recording the total litter weight in each transect, the collected litter is then sorted into seven categories (plastic, clothes, glass/ceramics, metal, paper/cardboard, rubber and wood) and weighed accordingly. Furthermore, the plastic category is divided into seventeen subcategories (see Appendix 1) which allows to record the regular appearance of common items such as plastic drinking bottles. The weight of all diminutive particles or items which cannot be sorted in one of the pre-defined categories, appears in the total weight of the transect. There is no extra category provided for these particles/items as these items can mostly not be recycled and make up the residual waste.

After sorting, weighting and recording the collected ocean litter, it was kept aside in dedicated collection bags in the engine room on the island, finally sent to the Chumbe Headquarter in Unguja and then picked up by Chumbe's partners Zanrec and Chako for recycling wherever possible, while the non-recyclables were given to the municipality. In order to find out more about the litter origin, drinking bottles were of special interest to the team as the number of unlabelled and labelled bottles were recorded, as well as their origins if still visible on the label.



Figure 1: Chumbe Island Clean Up Transect demarcations

	Latitude Start	Longitude Start	Latitude End	Longitude End
Transect 1	6°16'49.4"S	39°10'34.7"E	6°16'57.0"S	39°10'40.6"E
Transect 2	6°16'57.0"S	39°10'40.6"E	6°16'56.5"S	39°10'44.8"E
Transect 3	6°16'56.5"S	39°10'44.8"E	6°16'46.7"S	39°10'42.6"E
Transect 4	6°16'46.7"S	39°10'42.6"E	6°16'37.8"S	39°10'39.6"E
Transect 5	6°16'37.8"S	39°10'39.6"E	6°16'29.9"S	39°10'38.8"E
Transect 6	6°16'29.9"S	39°10'38.8"E	6°16'27.8"S	39°10'35.9"E
Transect 7	6°16'27.8"S	39°10'35.9"E	6°16'44.1"S	39°10'34.8"E
Transect 8	6°16'44.1"S	39°10'34.8"E	6°16'49.4"S	39°10'34.7"E

Table 1: GPS coordinates of Clean Up Transects

3. Results

In total 69 kg marine litter was collected during these four Beach Clean Ups, whereby the total weight per each Clean Up Event varied considerably between the conducted events.

We found that most of the litter (nearly 40 kg) was collected during our second Beach Clean Up on 18th of March. After that, we found significantly less amount of litter (see Fig. 2).

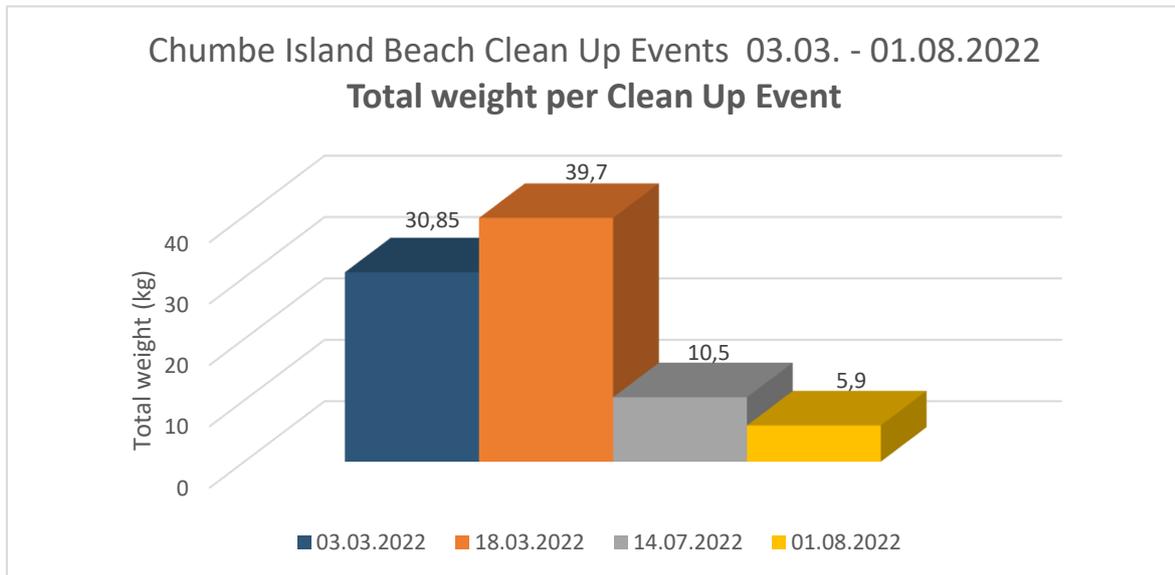


Figure 2: Total weight collected per each Clean Up Event

This could indicate that Zanzibar's monsoon season changing in the middle of March could have an influence on how much litter is washed up. Additionally the cooler months in July and August showed remarkably less litter appearance in contrast to what we expected, as this time of year is Zanzibar's tourism high season within the European summer, which means a lot of extra consumer trash ending up in nature and oceans around the Zanzibar archipelago. As there were no Beach Clean Up Events in the months of April, Mai and June because of seasonal island closing and maintenance work, there are no results on how the local raining season affects the littering of Chumbe's shores.

Regarding the distribution of littering on the West and East coast, we found, that the East coast was substantially more polluted (see Fig. 3). This could be a result of the occasional Clean Up activities along the western shore by island staff and visitors, especially the visitor beach Bahari Breeze in Transect 1, while the eastern coast is more remotely.

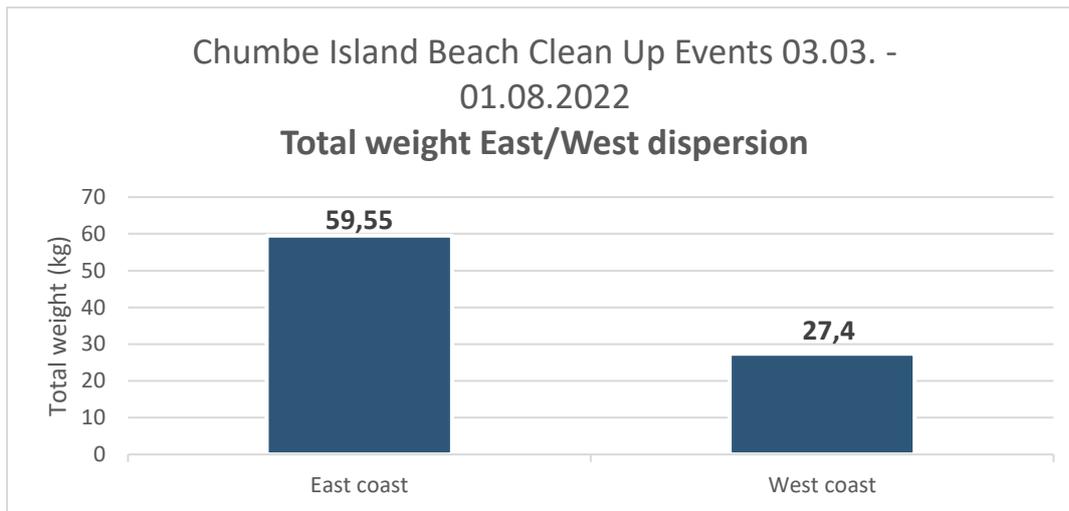


Figure 3: Total weight from all Beach Clean Up Events, comparing the ocean-facing West coast and the Zanzibar-facing East coast

This can also be seen in the distribution of litter along the eight transects (see Fig. 4). Transect 1 and 3 stand out for their higher litter weight, compared to the other transects. This may also be due to the geomorphological formation of the rocky bay that acts like a catch basin for incoming currents and litter.

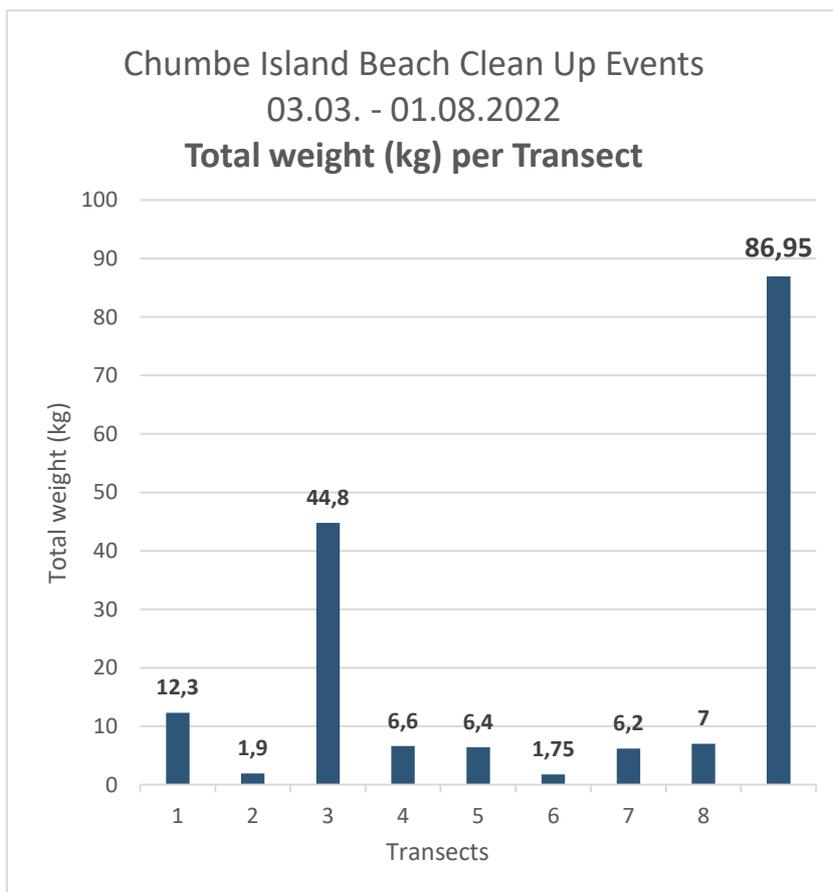


Figure 4: Total weight from all Beach Clean Up Events, comparing all eight transects

When looking further into the individual categories of litter (see Table 2), it was observed that the West coast was mostly littered by glass items, whereas the litter at the East coast was dominated by plastic. In general nearly two thirds of all ocean litter collected consisted of plastic and more than a quarter consisted of glass and ceramics, which were mostly heavy items like broken glass bottles. Clothes, metal and paper were less often found, whereas rubber was not recorded at all (Fig 5).

category	Total weight (kg)
plastic	42,40
glass/ceramics	20,15
clothes	2,10
metal	1,35
paper/cardboard	0,90
rubber	0
wood	0,80

Table 2: Total weight of all Clean Up Events per category

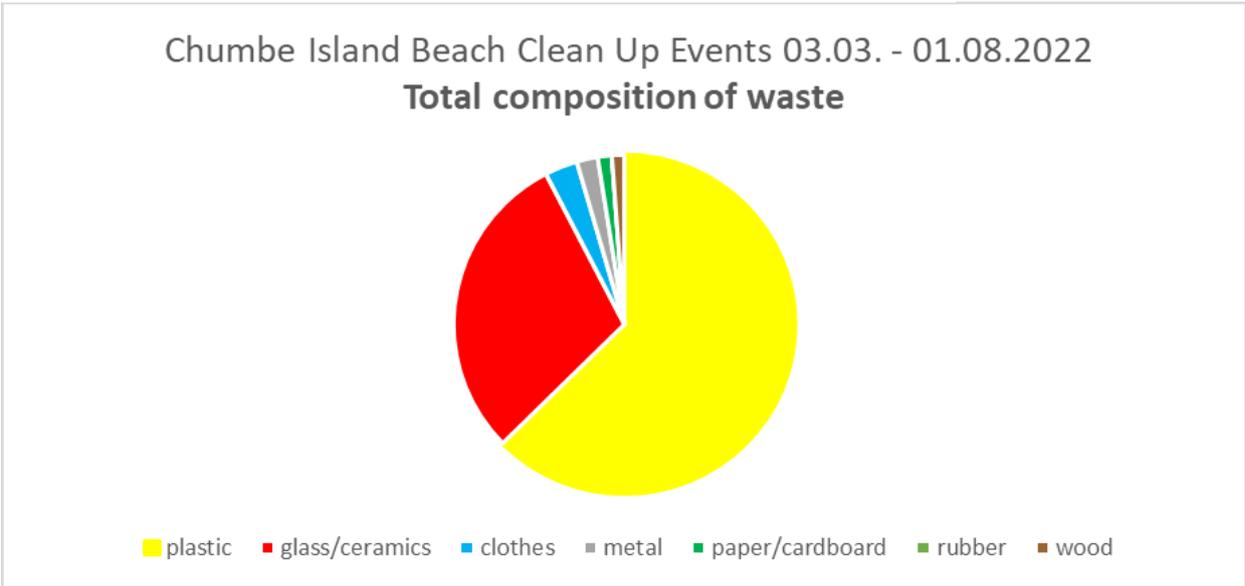


Figure 5: Total composition of waste (in percent) collected during four Beach Clean Up Events

Within the seventeen subcategories of plastic, the category “drinking bottles” dominated with 19,75 kg, which represents 47% of the category “plastic” and 23% of the total litter collected during all four Clean Up Events.

Moreover, it is significant to mention that certain categories such as the subcategory “foamed plastic” are very abundant in volume, however they contribute less to the total weight recorded.

Whenever possible, we also analysed the origin of marine litter. This is possible when an item still holds a label that includes a barcode or address of origin. Therefore, we focused particularly on identifying plastic drinking bottles. Out of the 340 plastic drinking bottles collected, 198 were still labelled, while the remaining (142) had no labels anymore. More than the half of all labelled plastic drinking bottles could be clearly identified of Zanzibar origin, another remarkable percentage came from Dar es Salaam (Tanzania).

Figure 6 spotlights the distribution of the most common drinking bottle brands found around Chumbe Island. Predominant were drinking bottles from the brands Drop of Zanzibar (Zanzibar) and Azam (Dar es Salaam, Tanzania), with 'other' percentages consisting of small parts of various other brands.



Figure 6: Distribution of labelled drinking bottles per brands

However, it is important to mention, that no guarantee for the congruence of location of origin and place of consumption can be provided. For example, it is possible, that a plastic drinking bottle was produced in Dar es Salaam (Tanzania), then transported by ferry to Zanzibar and consumed in Zanzibar where it was dropped in the environment or ocean. Still this method allows us to gain a rough insight into the distribution and floating of drinking bottles in the Zanzibar Channel.

Overall, it can be summarized that we have collected, identified and sorted a substantial total weight of marine litter in each Clean Up Event.

4. Conclusion

These four Beach Clean Ups aimed at training volunteers in a scientific method to gather and analyse data from marine litter and adapting a regional data collection tool to the Chumbe Island context. Importantly, these Clean Up Events were also a staff capacity building opportunity that involved the ranger team. These events also allowed to assess practicalities for conducting regular Clean Up activities on the island, alongside tourism operations.

Chumbe will continue Beach Clean Up and monitoring activities to further increase understanding around marine litter, ocean currents, seasonal influences, waste distribution and its dynamics around Chumbe Island within the Zanzibar Channel in the Indian Ocean.

Regular Clean Ups over a certain duration of time, ideally several seasons, will allow to better understand patterns and make certain predictions.

Limitations: Beach Clean Ups were originally scheduled to be conducted every two weeks, but due to challenges (including available staff, weather, maintenance work and other operational priorities), this target could not be reached. The annual maintenance season and closure of the touristic operations on the island, which takes place every year in April and May, meant that there were no Clean Ups in that period. Going forward it is recommended to schedule one Clean Up per month, taking into account tides, boat movements and tourism operations.

5. Appendix 1

	subcategories of plastic
1	cigarette lighters
2	cups/plates/cutlery
3	toys/figurines
4	flip-flops
5	battery
6	light bulb plastic piece
7	drinking bottles
8	cleaner bottles
9	cosmetic bottles
10	hard bottles
11	lures and hooks
12	ropes
13	nets
14	buoys
15	FADS
16	fragments
17	foamed plastic