

CHUMBE ISLAND



Conservation & Education

Status Report

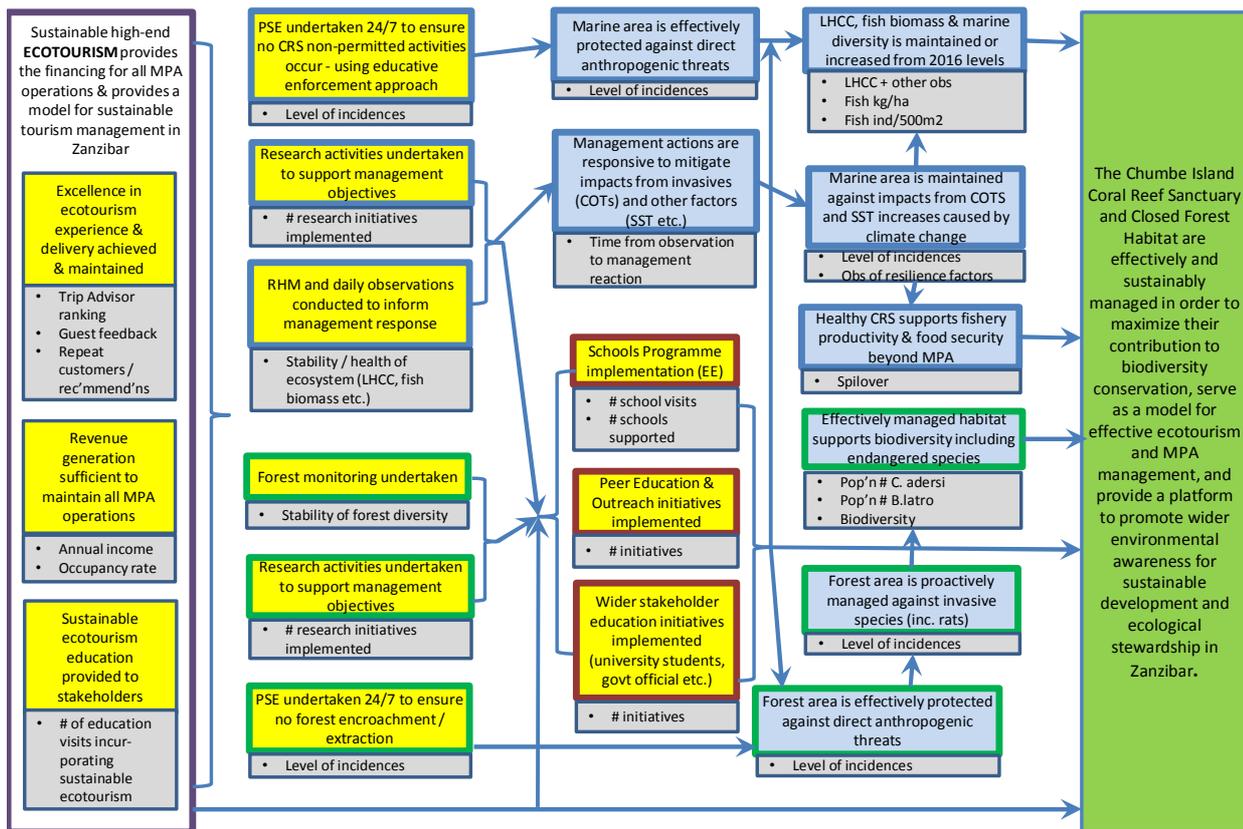
2017/18



CHUMBE ISLAND
CORAL PARK
Zanzibar Tanzania

Chumbe's overall vision

The Chumbe Island Coral Reef Sanctuary and Closed Forest Reserve are effectively and sustainably managed in order to maximize their contribution to biodiversity conservation, serve as a model for effective ecotourism and MPA management, and provide a platform to promote wider environmental awareness for sustainable development and ecological stewardship in Zanzibar.



Basic concept model to achieve overall Chumbe vision.

Citation: Kloiber (2018) 3rd Conservation & Education Status Report 2017-18.
 Cover photos: © CHICOP
 Available from: CHICOP, Zanzibar, Tanzania, www.chumbeisland.com

Acronyms

CFR	Closed Forest Reserve
CHICOP	Chumbe Island Coral Park
CO ₂	Carbon Dioxide
CORDIO	Coastal Oceans Research and Development - Indian Ocean
COT	Crown of Thorns
CR	Critically Endangered
CRS	Chumbe Reef Sanctuary
DC	District Commissioner
DCCFF	Department of Commercial Crops Fruits and Forestry
DoE	Department of Environment
EE	Environmental Education
FB	Facebook
GPS	Global Positioning System
IMS	Institute of Marine Science
ISP	Independent Study Project
IUCN	International Union for the Conservation of Nature
KPI	Key Performance Indicator
LHCC	Live Hard Coral Cover
ManPlan	Management Plan (2017-27)
MEL	Monitoring, Evaluation and Learning
MPA	Marine Protected Area
NE	North East
NGO	Non- Government Organization
NTA	No-Take-Area
PSE	Patrol, Surveillance and Enforcement
RHM	Chumbe Reef Health Monitoring
SE	Standard Error
SIT	School for International Training
SST	Sea Surface Temperature
SUZA	State University of Zanzibar
USA	United States of America
WCS	Wildlife Conservation Society
WIO	Western Indian Ocean
ZPC	Zanzibar Ports Corporation
ZU	Zanzibar University

Contents

INTRODUCTION.....	5
CONSERVATION	5
A. PATROL, SURVEILLANCE AND ENFORCEMENT (PSE).....	6
B. IN-HOUSE MONITORING.....	7
C. RESEARCH.....	10
ENVIRONMENTAL EDUCATION (EE)	13
Key achievements 2017/18	13
D. Schools programme.....	14
E. Community education and outreach programme.....	18
F. Wider stakeholder education initiatives	19

INTRODUCTION

This status report reviews achievements against strategic conservation and education related objectives that were set in line with CHICOP's 3rd ten year management plan (CHICOP, 2017) for the season 2017/18. Conducted annually, this report analyses results, identifies challenges and outlines key activities that need to be undertaken in 2018/19. 'Key Performance Indicators' (KPIs) are used to provide an at-a-glance view of the anticipated measurable milestones and targets for progress and have been assessed utilizing the various monitoring, evaluation and learning (MEL) mechanisms. Monitoring (M) progress, evaluating (E) achievements, and implementing an adaptive management approach based on lessons learned (L) are essential processes for achieving the various goals and targets identified and achieving overall management effectiveness.

CONSERVATION

The core strategic focus areas for CHICOP's Conservation programme are (A) Patrol, Surveillance and Enforcement (PSE), (B) In-house Monitoring and (C) Research (in collaboration with partners). In line with the current ManPlan (2017-27), targets and progress of Conservation KPI's for 2017/18 are outlined in Table. 1.

Table 1. Conservation KPI's for 2017/18 – measureable targets versus achievements.

Conservation KPI's		2017/18	
		Target	Achieved
# active PSE observations conducted in CRS	Compound	365	365
# CRS boundary marker maintenance checks conducted	Annual	4	7
Minimum # Security staff on island to assist with PSE	Annual	2	3
# Ranger reports submitted (filled on a daily basis) to Conservation & Education Manager	Compound	365	365
# Occasional Observation (OccObs) forms completed & submitted to Conservation & Education Manager	Annual	12	8
# Summary ranger reports sent to Department of Fisheries	Annual	4	4
# scientific publications	Annual	1	1
# presentations at conservation events and scientific conferences	Annual	1	1
# Reef Health Monitoring (RHM) full suite of surveys conducted	Annual	1	1
# WIO-SWWD (whale watching) annual events conducted	Annual	1	1
# Coconut crab population surveys conducted	Annual	-	1
Total av. Live Hard Coral Cover (LHCC) in CRS (in %)	Annual	≥ 50	Not measured
Total Fish Biomass in CRS (in kg/ha)	Annual	>1,000	2876.03kg/ha
Total sea urchin density in CRS (in m ²)	Annual	≤ 1	0.15/m ²
Total fleshy algae cover in CRS (in %)	Annual	< 10	Not measured
# Coral colonies observed with Bleaching stress (in %)	Annual	< 10	2.27 %
# individual corals showing evidence of disease in CRS (in %)	Annual	< 5	Northern CRS: 5.05% Central CRS: 3.16% Southern CRS: 1.94%
# COTS observed (in #/16ha)	Annual	< 2	0/16ha
# of SST loggers inside the CRS	Annual	2	2
# comprehensive research plans in place that are up-dated yearly (developed by April 2018)	Annual	1	0
# Ranger conservation all team meetings	Annual	6	>6 but individually

B. IN-HOUSE MONITORING

B.1. Coral Reef Sanctuary (CRS)

B.1.1. Benthos monitoring standards



Coral Reef Monitoring Workshop, Jambiani/Zanzibar, March 2018

CHICOP was excited to help organize and participate in a long anticipated coral reef monitoring workshop aimed at connecting various coral reef stakeholders from across Zanzibar, and providing basic coral reef health monitoring training to non-scientists. Led by Dr. David Obura and his team from CORDIO, this two day training was crucial to understand field survey protocols and enable the participants to take the first steps towards developing a customized coral reef monitoring protocol for our local reefs. Guiding Ranger, Ali Chagga participated in the workshop, while Conservation Manager, Ulli Kloiber helped with facilitation and provided field work assistance.

B.1.2 Seagrass monitoring data

From June 2017 to May 2018, two seagrass data sets (October & February) were completed in line with the SeagrassNet protocol. A scientific paper about the Chumbe seagrass data, titled “Temporal variability of a protected seagrass bed”, has been drafted and is led by PhD student Elisa Alonso from the Stockholm University.

B.1.3 Annual RHM

The eleventh year of Chumbe Reef Health Monitoring (RHM) was successfully completed in 2017/18, all data analysed and summary info sheets posted on the island notice boards. Table 2 shows key results against targets. The monitoring workshop (mentioned in B.1.1) was a first step towards achieving B.1.4., however, due to non-stop guest activities, it was not possible to conduct in-house training with Guiding Rangers and all the monitoring work continued to be conducted by Chumbe’s Head Ranger only.

Table.2. Ecological reef health indicators, targets and results from 2017/18.

Benthos	Target	2017/18 results
Live hard coral cover (LHHC)	≥ av. 50 % LHCC across all CRS	Photo-quadrats taken and submitted to CORDIO but not analysed, SIT student will conduct benthic survey in Nov. 2018
Fleshy algae cover	< 10 % fleshy algae cover on reef areas	Photo-quadrats taken and submitted to CORDIO but not analysed
Coral bleaching	< 10 % of colonies surveyed show indications of mortal bleaching	2.27 %
Coral disease prevalence	< 5 % corals surveyed show signs of disease	Northern CRS: 5.05 % Central CRS: 3.16 % Southern CRS: 1.94 %
Sea urchin density	≤ 1/m ² sea urchin density in CRS	0.15/m ²
COT density	<2/16ha COT density maintained	0/16ha
Fish data	Target	2017/18 results
Total fish biomass	≥ 1000 kg/ha fish biomass in CRS	2876.03kg/ha

B.2.3, B.2.4, B.2.5 Coconut crab

In September 2017, CHICOP started collaborating with Tim Caro, Professor of Wildlife Biology from the University of California in order to monitor Chumbe's resident coconut crab (*Birgus latro*) population. In 2015, Prof. Caro embarked on a coconut crab project working under the Department of Forest and Non-renewable Natural Resources (DFNRNR) on Pemba Island, Zanzibar, aiming to (1) facilitate setting up forest conservation areas in Pemba that will protect the crabs and other forest species, and (2) to find scientific evidence for the different colors of adult coconut crabs. As Chumbe Island provides a laboratory for an unexploited coconut crab population that has been protected for more than 20 years, Prof. Caro and his team have included Chumbe as a longterm study site for their research (Fig.3). In January 2018 an internal report for Chumbe was provided by Prof. Caro. Yearly surveys are planned and Chumbe rangers have the opportunity to assist and share knowledge with the research team.



Figure 3. Images from coconut crab research in 2017.

Roseate terns

In 2017, a 4th breeding colony of Roseate terns (*Sterna dougallii*) was monitored on Chumbe Island (Fig. 4): the terns arrived on the 22nd of June and used the two islets in the southern part of the CRS as breeding sites. Restricted visitor access to the islets was immediately put in place and for the first time, drone technology was used for initial monitoring purposes. By 3rd of September the terns continued their migratory route and a detailed report about the breeding colony was completed.



Figure 4. Images of Roseate tern monitoring in July 2017.

B.2.6 Invasive species monitoring

During September and October 2017, a total of seven Indian house crows (*Corvus splendens*) were shot by CHICOP patrol ranger, Ramadan (Fig. 5., upper left image). During 2017/18, Head Ranger, Omari Nyange, conducted regular chewstick monitoring surveys and found zero rats (Fig. 5., upper right image). Indication of rhinobeetles present in coconut trees close to the Education Center led to a survey in July

2017: Chumbe staff climbed on all coconut trees and used an iron hook to remove several rhinobeele larvae/adults (Fig. 5., bottom left image) from the heart of the coconut tip which was then filled up with sand. In April 2017, a large *Casuarina equisetifolia* tree (whistling pine) next to the Education Center had to be removed as its roots had started to destroy the concrete basin of the guest kitchen wetland and its branches had grown very close to the roof of the Education Center (Fig. 5., bottom right image).

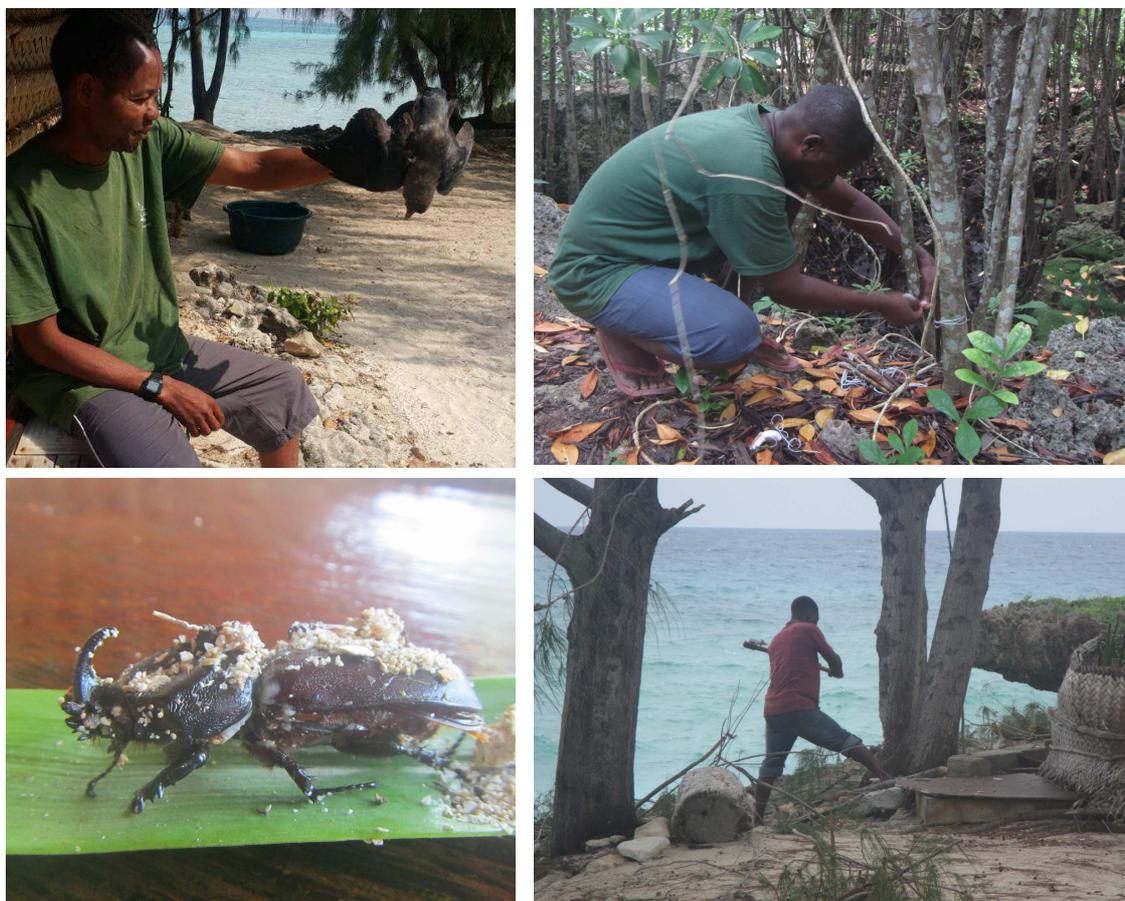


Figure 5. Images of invasive species monitoring

B.2.7 Ranger meetings & guest related training

Throughout 2017/18 ranger meetings were conducted on a regular basis, however, most of the time on a one to one basis (reports/minutes are not available from those meetings). Conservation related feedback from guest survey sheets were analyzed on a monthly basis from July 2017 to March 2018. Results were summarized and a copy was provided to the ranger team. A new welcome briefing format was drafted and discussed with the PM, Island Manger and ranger team in September 2017 but has not been implemented to date.

C. RESEARCH

Due to time constraints it was not possible to draft comprehensive research plans as outlined in C.1. and C.2.

However, during 2017/18 the following research activities were conducted by external reserachers:

- ❖ Prof. Tim Caro's coconut crab research as mentioned in B.2.3/4/5.

- ❖ Researchers, Dr. Gita Narayan and Ms. Theresa Schwenke stayed on the island on the 26th of November 2017 to collect data for their study “**Local marine taxonomic knowledge and its potential role in community-based conservation practices - a case study from Zanzibar, Tanzania**” which focuses on the use and transferral of local understanding of taxonomic knowledge within marine and coastal contexts and investigates the perceptions that local communities have of shelled local marine organisms and how this knowledge can benefit marine conservation practices and mentalities.
- ❖ Two students from the School of International Studies (SIT) Program did their field studies with Chumbe: (1) Emma Hultgren focused her study on ecotourism in the Western Indian Ocean and made a comparative analysis between Chumbe and Cousine Island/Seychelles, while (2) Samantha Pfeffer developed new strategies for Environmental Education for youths and adults, for the Chumbe EE program which resulted in the production of very creative teaching tools and games.
- ❖ Twenty years after the 1998 Water Bird census an attempt was made to organise another **International Waterbird Census (IWC)** in Zanzibar during January 2017. Selected areas were Menai Bay (including Chumbe Island) and Chwaka Bay area, both defined as Important Bird Areas (IBAs) by Birdlife International. Chumbe Island took part in this exercise by providing logistical assistance and staffing. Head Ranger, Omari Nyange joined the Menai Bay team which was supervised by German researchers, Ursula and Peter Koehler. Results have been written up in reports which are available as pdfs in the Chumbe office.

C.3 Research communication

C.3.1 Scientific publications

- ❖ Caro T. and Morgan V (2018): Correlates of color polymorphism in coconut crabs *Birgus latro*, *Zoology* 129 (2018) 1–8.
- ❖ Staehr, P. A., Sheikh, M., Rashid, R., Ussi, A. M., Suleiman, M., Kloiber, U., ... & Muhando, C. (2018). Managing human pressures to restore ecosystem health of Zanzibar coastal waters. *Journal of Aquaculture and Marine Biology*, 7(2), 59-70.

C.3.2. Communication collaerals

- ❖ Up-dated research fact sheets in Education Center on Chumbe Island
- ❖ Facebook postings: Ramadan Ranger series, 9th SWWD 2017, Chumbe Management Plan, Bubble Rafting Snail Quiz, Coconut Crab investigation, Rare, elegant and beautiful - Roseate terns back in Chumbe, Chumbe UW Photo-guide 2017 and others
- ❖ Chumbe Island Coral Park was featured on the National Geographic Wild Channel "Jane Goodall, Saving Paradise", a documentary that showcases the important work of three conservationists in Tanzania. The documentary was broadcasted in Europe (4th March) and in the USA (9th of March).

C.3.3. Conferences and workshops

❖ **10th Western Indian Ocean Marine Science Association (WIOMSA) symposium**

30th Oct – 4th Nov 2017, Dar es Salaam/Tanzania

Chumbe's Conservation Manager featured as co-author on the poster "Understanding the impacts of the 2016 Coral Bleaching event in the WIO using a citizen science approach" and contributed to various discussion and special sessions.

❖ **ZAN-SDI Workshop on marine conservation, coastal and marine spatial planning (CMSP) and locally managed marine areas (LMMAs), 16th Nov 2017, Stone Town/Zanzibar**

Conservation Manager and her assistant shared insight in Chumbe's research work and provided feedback to presented project results and potential future activities.

❖ **Emergency stakeholder meeting in regards to seismic survey conflicts in Zanzibar, 21st November 2017, Stone Town/Zanzibar**

Chumbe Island was represented by the Project Manager and Conservation Manager. This meeting was conducted by the Zanzibar Petroleum Regulatory Authority (ZPRA) in response to serious conflicts between shallow water dive boats and seismic vessels operated by RakGas, and aimed at resolving these conflicts through improved and timely communication between all maritime stakeholders.

❖ **OfDP Stakeholder Workshop, 5th & 6th December 2017, Stone Town/Zanzibar**

This 2 day workshop was facilitate by the Norwegian Agency for Development Cooperation's Oil for Development Program (OfDP) in cooperation with the Zanzibar Environmental Management Agency (ZEMA) and involved onshore and offshore oil and gas exploration scenario group work. Chumbe Island was represented by the Conservation Manager and her assistant.

❖ **OECD Green Growth and Sustainable Development Forum, "Greening the Ocean Economy" November 21-22, Paris/France.**

In the panel discussion on tourism, **Sybille Riedmiller** presented the successful implementation of a private marine protected area in Chumbe Island, Zanzibar. She made a strong case for private protection, environmental education and co-management, financed by sustainable tourism.

❖ **Stakeholder Meeting by Duke University Marine Lab: Understanding the relationships between protected areas and adjacent communities in Tanzania, Saadani National Park/Pangani Region, 10th January 2018**

The goal of this project is to develop long-term research collaborations centered on understanding how protected areas are linked to the wider landscape: socially, politically and institutionally, and what outcomes local communities experience in relationships to those protected areas. Conservation and Education Assistant represented Chumbe Island and provided further insights in lessons learned and challenges of private MPA management.

ENVIRONMENTAL EDUCATION (EE)



The core strategic focus areas for CHICOP's EE programme are: (D) schools programme, (E) peer education and outreach initiatives and (F) wider stakeholder education initiatives. In line with the current ManPlan (2017-27), targets and progress of EE KPI's for 2017/18 are outlined in Table. 3.

Table 3. Education KPI's for 2017/18 – measureable targets versus achievements.

Education KPI's	2017/18	
	Target	Achieved
# total EE trips conducted to Chumbe Island	35	37
# total EE trips with other sponsorship than CHICOP	2	3
# EE school trips conducted to Chumbe Island	16	18
# school children participating in EE schools trips to Chumbe Island	224	226
# teaching personnel (including local schools, Universities and NGOs) participating in EE trips to Chumbe Island	25	48
# community EE trips conducted to Chumbe Island with 'Non-Target' communities	6	5
# fishers participating in EE trips to Chumbe Island	90	85
# EE University trips with SUZA University	1	1
# EE University trips with IMS Zanzibar	1	1
# EE University trips with other national Universities	5	4
# University students participating in EE trips to Chumbe Island	98	105
# EE trips conducted to Chumbe Island with government departmental agencies	2	2
# Government officers participating in EE trips to Chumbe Island	30	23
# EE trips with associated local NGO-Training Centers	2	4
# NGO members participating in EE trips to Chumbe Island	28	45
# 'International days' recognized through event based activities on/off the island	1	3

Key achievements 2017/18

From June 2017 to April 2018, CHICOP has conducted a total of 37 environmental field excursions to Chumbe Island. Out of them three trips received sponsorship outside of CHICOP, while the other 34 trips were entirely funded through CHICOP's eco-tourism revenue stream. A total of 226 school children, 105 University students, 48 teaching personnel, 45 NGO members, 85 fishers and 23 government officials participated in those excursions. This adds up to a total number of 9,724 participants that have been involved in EE trips to Chumbe Island since the program started in 1996 (Fig. 6).

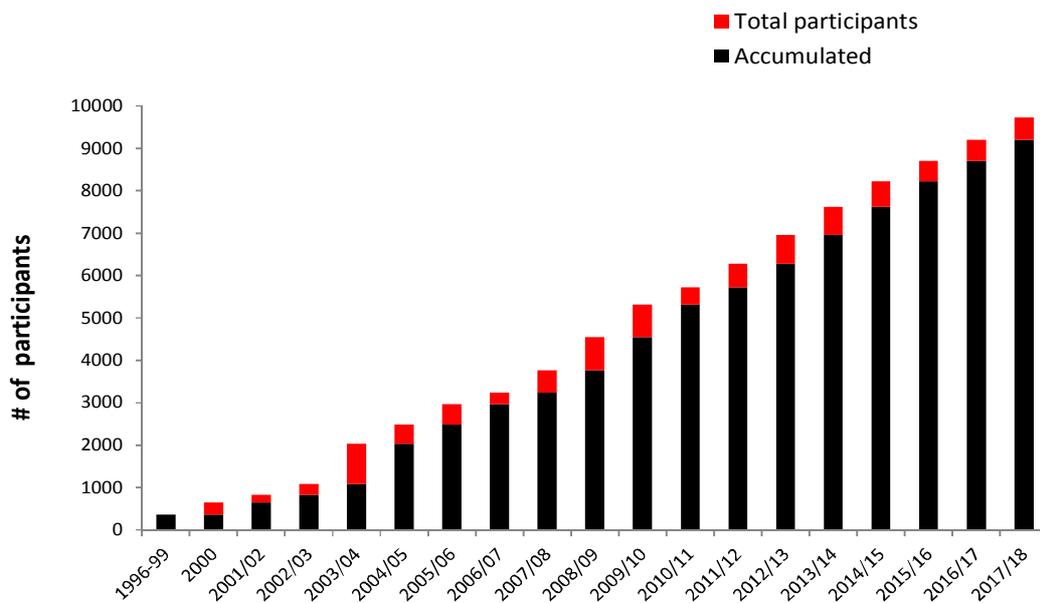


Figure 6: Total number of participants (students, teachers, government officials and community members) that have participated in EE trips to Chumbe Island, accumulative from 1996 until April 2018.

D. Schools programme

In line with D.6, Pre/Post questionnaires were developed at the beginning of phase 14 (Fig. 7) and were used for all 17 secondary schools that participated in the EE season 2017/18. Only one school (Makunduchi Secondary School) failed in completing post visit questionnaires and had to be removed from the assessment.

Pre/Post questionnaires were completed by 165 students from 16 different secondary schools in Unguja. Student age ranged between 11 and 25 years with an average age of 16 years. Out of the 165 school children, 59% were females, 41% were males, 58% stated to be non-swimmers (which in reality is a much higher percentage) and 30% have family that is involved in fishing activities.

Pre/post results reveal that 58% of the school children showed an increase in knowledge after the Chumbe EE field excursion, with averages across schools ranging from 3 to 20 % (see table 4). The biggest positive knowledge change could be achieved among the topics of: coral (Q1), ocean (Q3) and destructive fishing (Q7) as outlined in table 5.

55% of the school children mentioned that they have done environmental activities after the Chumbe EE field excursion. The most common environmental activities included: educating parents and friends about what they have learned on Chumbe, planting trees, starting composting, waste separation and recycling.

The biggest challenge for evaluating the impact on learning remains to be working with the same school children, also displayed in table 4 as (n) which is the number of children that completed all three elements of the school program (pre-test, Chumbe excursion and post-test).



TELL US ABOUT YOU!

PRE

First name: Last name: Age: Do you know how to swim? Yes or No Is your family involved in fishing? Yes or No	School: Standard/Form: Are you a member of your school's environmental club? Yes or No
---	---

A) Directions: circle the correct answer for each of the following questions:

1. What is a coral?	Plant (living)	Stone (non-living)	Animal (living)
2. The environment includes	only people	living and non living things (plants, animals, roads, houses, air,...)	only living things around us (plants, animals, humans)
3. The ocean around Unguja	is healthy and clean	has a lot of problems caused by humans	is called Pacific Ocean
4. Why are mangroves so special?	They grow only in Zanzibar.	They are salt-tolerant trees and grow along the coast.	They have flowers, fruits and leaves.
5. What is a marine protected area?	An area in the ocean where only tourists can go.	An area with a fence where fish is protected because they can't swim out.	An area in the ocean which is protected through fishing rules and regulations.
6. In order to have more fish in the ocean we need to	protect coral reefs	increase number of fisherman	eat less fish
7. Which fishing technique is most destructive?	Nets with small holes	Dynamite fishing	Fish traps
8. Throwing taka-taka in the ocean is...	good because there is no good waste system on land	not a problem because the ocean is so big	a big problem and dangerous for animals, plants and humans!
9. Using the ocean sustainable means	stop fishing	protecting the ocean for future generations	planting trees
10. What is Chumbe Island?	University	Luxury hotel, where local people are not allowed to go	Island which protects a coral reef



TELL US ABOUT YOU!

POST

First name: Last name: Age: Do you know how to swim? Yes or No Is your family involved in fishing? Yes or No	School: Standard/Form: Are you a member of your school's environmental club? Yes or No
---	---

A) Directions: circle the correct answer for each of the following questions:

1. What is a coral?	Plant (living)	Stone (non-living)	Animal (living)
2. The environment includes	only people	living and non living things (plants, animals, roads, houses, air,...)	only living things around us (plants, animals, humans)
3. The ocean around Unguja	is healthy and clean	has a lot of problems caused by humans	is called Pacific Ocean
4. Why are mangroves so special?	They grow only in Zanzibar.	They are salt-tolerant trees and grow along the coast.	They have flowers, fruits and leaves.
5. What is a marine protected area?	An area in the ocean where only tourists can go.	An area with a fence where fish is protected because they can't swim out.	An area in the ocean which is protected through fishing rules and regulations.
6. In order to have more fish in the ocean we need to	protect coral reefs	increase number of fisherman	eat less fish
7. Which fishing technique is most destructive?	Nets with small holes	Dynamite fishing	Fish traps
8. Throwing taka-taka in the ocean is...	good because there is no good waste system on land	not a problem because the ocean is so big	a big problem and dangerous for animals, plants and humans!
9. Using the ocean sustainable means	stop fishing	protecting the ocean for future generations	planting trees
10. What is Chumbe Island?	University	Luxury hotel, where local people are not allowed to go	Island which protects a coral reef

B) Please use the backside of this paper to tell us which environmental activities you have done AFTER the Chumbe field trip. (5 minutes only)!!

Figure 7. Pre/Post questionnaires for secondary schools during phase 14 (2017/18).

Table 4: Pre-post results of all schools participating in EE trips during phase 14. (n) = number of students that completed all 3 elements of the school program (pre-test, Chumbe excursion and post-test).

Results are shown as average % per school.

	School name	(n)	Pre-test (%)	Post-test (%)	Knowledge change (%)
Phase 14 (2017/18)	1 Kilindi	21	67,1	72,9	6
	2 Vikokotoni	12	65,0	70,8	6
	3 Jambiani	12	53,3	67,5	14
	4 Kiembesamaki	11	61,8	76,4	15
	5 Lumumba	11	79,1	81,8	3
	6 Kiponda	11	74,5	81,8	7
	7 Mpendae	11	62,7	73,6	11
	8 Bwefum	10	68,0	74,0	6
	9 Skuli ya Biashara	10	75,0	85,0	10
	10 Faruk Aktas	9	73,3	90,0	17
	11 Bububu	9	42,2	55,6	13
	12 Maungani	9	51,1	66,7	16
	13 SOS	8	87,5	95,0	8
	14 Haileselassie	8	53,8	73,8	20
	15 Willey Academy	7	71,4	88,5	17
	16 Benbella	6	86,7	91,7	5

Correct answers	Pre % (av)	Post % (av)	Impact/Change
Q1 Coral	16	44	28
Q2 Environment	75	76	1
Q3 Ocean	35	54	19
Q4 Mangroves	76	85	9
Q5 MPA	72	80	8
Q6 Protection linked to more fish	85	93	8
Q7 Destructive fishing	44	56	12
Q8 Waste	84	92	8
Q9 Sustainable ocean use	88	89	1
Q10 Chumbe Island	89	97	8

Table 5: Pre-post results according to questions (Q1-Q10). Results are shown as average % out of 165 students.

Teacher evaluation workshop

In line with D.7 and D.8, a half-day teacher evaluation workshop was held at Kiembesamaki Teacher Training Hall on 5th of May 2018. All 15 lead teachers who had participated in the EE excursions with their respective schools during the 2017/18 EE season attended this workshop.

Out of the 15 teacher, 80% were male and 20% were female. Their age ranged between 25 and 59 years, 40% of them have been teaching for more than 10 years (Fig. 8) and 80% had more than one year teaching experience in the school that participated in the EE program during the 2017/18 season, while for 33% it was their first time to come to Chumbe Island.

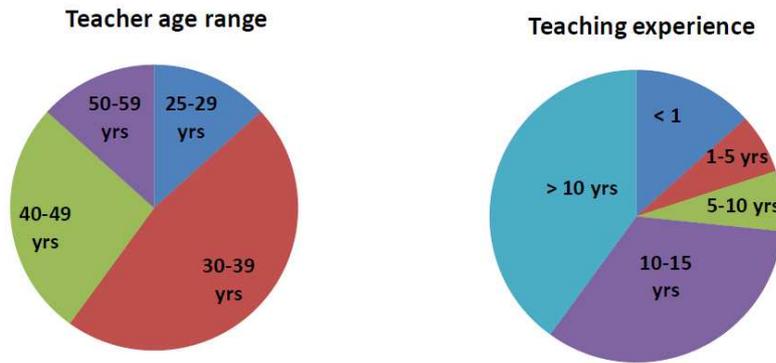


Figure 8. Teacher age range and teaching experience

In total 93% of the teachers agreed that there were enough practical session during the field trip and that the classroom session on the island was not too long. In regard to teaching methods, 73% of the respondents agreed that the Chumbe teaching methods are according to student’s age and all teachers agreed that the field trip content corresponded to the curriculum that they are teaching in their schools and that their own understanding about marine conservation has increased through Chumbe the education program. As there is always room for improvements, 73% of the teachers provided input on how the teaching methods could be improved: (1) displaying short video about what students going to learn, (2) providing handout to students, (3) to use projector, (4) conducting group discussions, (5) more solution based teaching (6) more focus on practical learning than lectures, (7) more interactions with students and teachers through learning by doing.

In regard to the next EE phase (2018-2022) three focus areas (overfishing and destructive fishing, marine pollution and shark conservation), and the option to propose other focus areas of their choice were given to the teachers.

As seen in Figure 9, the majority of teachers voted for marine pollution, while no other topics were proposed. Among the proposed improvements for the Chumbe field trips in the coming year, the following 3 suggestions got the most responses:

- Include more practical exercises and simple experiment
- Add an interactive/educational game
- Increase time in the water if tides allows

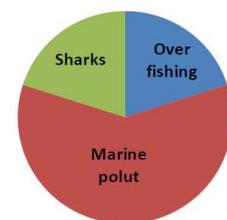


Figure 8. Focus areas for next EE phase

Feedback from the Chumbe EE team to the teachers:

- Teacher who is involved in excursion should also attend pre/post visits
- Schools that will not cooperate after field trip for post-visit, will be banned from next EE season.
- Schools that will have less than 10 students or negative results during the post-testing will not be given priority in the next season.
- Teachers can only select three students who need to do national examination after the Chumbe field trip (form four and six)

At the end of the workshop, Jambiani Secondary School was awarded with posters from our “Pack for a purpose” partners as the E-club students that came to Chumbe had shown the best performance during the pre/post- testing with an overall 14% knowledge increase after the Chumbe field trip.

Island Classroom and education material

In line with objectives D.9 and D.10, the island classroom and all information panels have been maintained to ensure optimal educational support (Fig. 9). Daniela Stubs, a volunteer from DtP (German-Tanzanian Partnership) got involved in the creative design of the the information panels and in addition, new educational cards for the displays have been designed and placed on the book shelf. All educational material for the information panels will be reviewed and updated for the EE season 2018/19.



Figure 9. Images from educational material in the Island Classroom

E. Community education and outreach programme

In line with E.5 the following ‘non-target’ fishing communities visited Chumbe Island: Kizimkazi, Kendwa/Kilindi, Jambiani, Pemba/Tumbatu/Kiwengwa (mixed group), mixed group of female invertebrate harvester from Western District. Out of the 6 targeted community trips, 5 could be completed, while one trip was left open for a community that couldn’t participate in the end. Environmental Education on Chumbe Island was provided by Head Ranger, Omari Nyange. All impact assessments were done by Enock Kayagambe using small focus group discussions (FGDs) with community members on the same day, before and after the field trip (discussion questions outlined in Fig. 10).

EE - Fishing community – Questionnaire 2017/18

Community: Date of EE trip:

Name of EE-Educators:

Pre-trip questions

1. What do you know about Chumbe Island?
2. What is a MPA?
3. How have your fishing grounds changed over the last 10 years?
4. Is the coral reef in your fishing area healthy or destructed, why?

Post-trip questions

1. What did you find most interesting during your Chumbe field trip?
2. Do you think a MPA has any benefits for you?
3. How would you describe the Chumbe reef after you snorkelled there?!
4. What can you do, to protect the coral reefs in your fishing area?



Figure 10. Questionnaire for FGDs with community members 2017/18

Key findings from FGDs: most community members knew that Chumbe is an island with a hotel where tourists can go, however, there is still the perception that local people are not allowed to go to Chumbe at all. Chumbe was also linked to conserving the environment but not by all communities. MPA knowledge was quite high even before coming to Chumbe. All communities stated that their fishing grounds had changed a lot in a negative way, which they have voiced as less fish being available and caught, increased number of fishermen and more time spent on fishing further away from coast. The reef condition in their fishing grounds was rated unhealthy with corals being broken by fishermen, or turning

white (bleaching). Snorkeling and the classroom session were found most interesting during the EE trip and the MPA was seen as a positive initiative to help increase the number of fish. The Chumbe reef was described as being healthy, with a lot of fish that can't be seen in other reefs anymore. Many community members were also surprised by the big size of the fish. Protection of their own fishing grounds was seen as an important step; however, all communities mentioned that more education is needed to get more community members on board and lacking support from the local government. Some community members had experience in setting up local fishing rules in order to protect some areas but they faced a lot of challenges with enforcing those regulations.

Key achievements, challenges and outlook: very successful cooperation with other NGOs and marine actors in approaching community members from villages outside CHICOP's 'Target' communities. MEL method has been developed and implemented but FDGs don't allow for a quantitative assessment of knowledge increase, hence, it was not possible to assess if the 50% target has been achieved. MEL method needs to be reviewed for 2018/19.

F. Wider stakeholder education initiatives

In line with F.1 EE trips for Universities were conducted with SUZA and IMS (target Universities), as well as with the following application based institutions: Karume Institute of Technology, College of Health Science, Zanzibar University (Biology Students) and Zanzibar University (Geography Students). However, last minute requests/applications from Universities to be included in the 2017/18 EE season meant that four instead of five EE trips could be accommodated. In line with F.2 an online pre/post survey as MEL method was developed for University students but unfortunately students faced challenges with internet access, so the online MEL didn't provide enough results. A new pre/post questionnaire was developed to be given on the excursion day and trialed with SUZA and IMS towards the end of the season. At the end of the season, out of 105 participating students, 44 filled out pre/post questionnaires and out of them 100 % were able to articulate how their experience on Chumbe will influence their career planning and testimonials include:

- The Chumbe field trip inspired and motivated me to focus on coral reef ecology.
- Since I was among the students who got the opportunity to visit Chumbe Island through the EE program, I'm eager to be an ambassador for marine conservation in Zanzibar.
- The EE trip has improved my critical thinking skills and I'm looking forward to exploring ways of planning my professional life in line with sustainability.
- Due to the EE trip I'm really interested in working with local communities and tourism projects.
- I've never seen a composting toilet before but would love to install one in our University and professionally become involved in eco-technologies.

In addition to national Universities, CHICOP also offered environmental education on Chumbe Island to international field school programmes, involving the School of International Training (2 EE day trips) and the James Madison University's East Africa Field School (JMU) programme (4 nights at full guest rate). Designed to serve majors from many different disciplines, JMU offers a unique opportunity to learn about people, cultures, and environments of contemporary Tanzania through direct interaction. Over the last 3 years Chumbe Island has been one of the program's highlights where 30 students spend 4 nights on the island in order to study sustainability on all levels through focus area discussions, assignments and reef surveys (Fig. 11).



Figure 11. Images from JMU activities on Chumbe Island.

In line with F.3 and F.4, EE trips for government officials were conducted with key members from (1) the Registrar Office and (2) the Ministry of Trade and Investment, headed by the Principal Secretary. Both groups were very impressed by the project and in depth discussions with the Chumbe Team allowed for great knowledge and idea exchange. Pre/post questionnaires to quantitatively measure if the understanding of the Chumbe project has changed could not be given to these top rank government officials as this would have offended them. Hence, implementation of another MEL system for local government agencies still needs to be developed for the next season.

In line with F.5 and F.6, EE trips for local NGO/training centers were conducted with: Kawa Training Center, Timu ya Umoja Veterani Zanzibar, Jumuiya ya maendeleo Magomeni and Zanzibar International Students Network. A MEL method was developed but post-visits after the EE trip were not feasible for local NGOs, hence for 2018/19 a questionnaire will be handed out on the same excursion day, before and after the activities in order to collect testimonials.

In line with F.7, at the beginning of the 2017/18 EE season, a calendar which summaries all internationally recognized Environmental Days was produced and the following 3 international events were targeted for activities with youth off the island:

World Ocean Day, 8th June 2017: “Our Oceans, Our Future” was the theme of this year and Chumbe's EE team was thrilled to spend this day with Chumbe staff and JMU students on the island (Fig. 11). All activities were tailored to the given conservation action focus “Encouraging solutions to plastic pollution and preventing marine litter for a healthier ocean and a better future.”



Figure 11. Images from World Ocean Day, 2017.

Chumbe has made a call for a drawing and essay writing competition, linked to the **World Forest Day, 21st March** and the **World Water Day, 22nd March 2018**. Students were encouraged to write an essay about their imaginary life as a tree in Zanzibar. For World Water Day, school environmental clubs were encouraged to draw environmental posters, displaying “sustainable nature based water solutions in Zanzibar.” All posters and essays were marked by the EE Chumbe team and all prizes (education books, drawing material, and classroom posters) have been donated by our guests through the “Pack for a purpose” initiative (Fig.12).



Figure 12. Images from essay writing competition and awarded prices.

Guest donations

Through the ‘Pack for a purpose’ initiative which CHICOP has joined in 2016, guests have donated 13.3 kg of EE items (books, posters, stationary, etc.) that were brought to the island in 2017/18.

In addition, guests also made the following monetary donations to support the EE programme based on the information sheet that is displayed on the table in the Education Centre (Fig. 13):

Cash donations (US\$):	121,-
Cash donations (TSH):	311,000,-
Credit card donations (US\$):	230,-



Sponsoring a local school trip

One of Chumbe's missions is to create awareness about coral reefs and environmental issues among local people. To help improve the situation in Zanzibar, Chumbe has developed an environmental course programme that brings school children to Chumbe Island, guided by our environmental educators on the reef and in the forest. More than 7400 students from all over Zanzibar have already benefited from the insight they gain in marine biology, forest ecology and environmental protection during this day excursion, and for more than a decade now, our environmental education programme has been the only regular and large-scale programme in the country that fills this gap in school curricula.

One thing that differentiates Chumbe from most projects with social, rather than financial goals is that we don't receive donor funds for our core activities. Therefore, we would like to thank all our guests that decide to visit our project: without YOU there would be no conservation and education programmes!

For guests who would like to contribute beyond that, we would like to highlight our **school trip sponsorship programme**: each season Chumbe funds on average 35 education trips for 15 Zanzibari school children per trip and covers the full expenses including bus and boat transfers, lunch and drinks worth US\$ 10 per student. Donations towards sponsoring school trips for additional school children can be made directly on the island including payment confirmation and receipt of a follow-up image once your student has been to the island.

Thank you very much for your support.



Figure 13. Infosheet for EE donations

To date (April 2018) the EE donation fund, therefore, holds:

Cash flow (US\$):	420,-
Cash flow (TSH):	1,111,000,-
Not cashed from credit card (US\$):	360,-