

Dedication

To my late father

To my late grandfather and grandmother

To late Dr. Muammar Al-Jayeh Ali

To my mother

To my brothers and sisters

To my friends

Acknowledgment

In the name of Allah. Most gracious and most merciful peace be upon his beloved prophet Mohammad S.A.W and his companions and followers until the day of judgment.

First and foremost, “Alhamdolilah” thanks to Allah for giving me power and health to complete this work, and facilitated all difficulties.

I would like to extend my most sincere gratitude to Prof. Sheikheldin Mohamed Elnaeim, the main supervisor, for his invaluable contributions, advice, tutelage and careful supervision of my study. I am profoundly indebted to the members of my Co supervisor, Dr. Kristy Nash (Australian) for his assistances and cooperative .

I am very grateful and acknowledge the Institute Marine Research (Norway) and Unido for the scholarship. This thank is also to Dr. Even Moland and Dr. Althair for their help. I wish to extend my appreciation to Faculty of Marine Sciences and Fisheries, this thank sent to Dr. Moamer Eltayeb with profound humility and honor. I take this opportunity to remember him and may Allah forgive him of this sins and reward him abundantly.

I must not forget Dr. Osman Farah, Dr. Abdel Alazeem Osman, Dr. Sheikh Basheir, Mr. Elfateh Bakry and Mr. Abdl Al raheem for helping me, a lot of thank to them.

I am greatly indebted to my brothers Mostafah Mohamed Mostafah and Motrada Musa, I am Indebted to my family and my friends to support and encouragements.

Words are not enough to express my gratitude and feelings to my mother Rabha Ahmed Mohamed and my late father Yousif Ibrahim

for their guidance, sacrifice and encouragement. All of my appreciations and thanks to my brothers and sisters who have extended their encouragement and moral support which serve as my stimulation to perform this study.

Last but not least, special thanks are for my aunts. A lot thank who bring more motivation for me to perform this achievement.

Deeply grateful to all whom so ever directly or indirectly helped me.

DECLARATION

I hereby declare that this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Red Sea University or other institutions.

(Signature)

Khadija Yousif Ibrahim Abaker

Date: 15. 11. 2021

APPROVAL

This is to certify that an Examination Committee has met on 15th November 2021 to conduct the final examination of Khadija Yousif Ibrahim Abaker on her Master of Sciences thesis entitled “Baseline assessment of coral reefs health status along the Sudanese Red Sea coast” in accordance with the regulations approved by the Red Sea University senate. The Committee recommends that the candidate be awarded the relevant degree. The Examination Committee members were:

	Name	Rank	Signature
External Examiner	Elamin Mohamed Elamin	Assistant Researcher	
Internal Examiner	Amjad Gnawy	Assistant Prof.	
Supervisor	Sheikheldin Mohamed Elamin	Associate Prof.	

LIST OF ABBREVIATIONS

UVC	:	Underwater Visual Census
°	:	Degree
°C	:	Degree Centigrade
%	:	Percent
‰	:	Per thousand
Cm	:	Centimeter
CTD	:	Conductivity Temperature Density
IUCN	:	International Union for Conservation of Nature
D	:	Depth
HC	:	Hard Coral
SC	:	Soft Coral
RKC	:	Recently Kild Coral
RC	:	Rock
RB	:	Rubble
SD	:	Sand
ALG	:	Algae
SP	:	Sponge
OT	:	Other
GBR	:	Greet Barrier Reef
H'	:	Shanon diversity
E	:	Evenness
R	:	Richness
Kg	:	Kilogram
Km	:	Kilometer
M	:	Meter
Mg	:	Milligram
MPAs	:	Marine Protected Area

**Abstract of thesis presented to the Senate of Red
University in fulfillment of the requirement for the degree of
master of Sciences**

**Assessment of coral reefs health status along the Sudanese Red
Sea Coast**

Khadija Yousif Ibrahim Abaker

November 2021

Main Supervisor : Prof. Sheikheldin Mohamed Elamin

Co- Supervisor : Dr. Kristy Nash

Faculty of Post Graduate Studies

This Study was conducted to assess the health status of coral reefs in the Sudanese Red Sea coast, aiming to establish baseline data for future studies, develop a data of the reef communities along the Sudanese Red Sea coast, document coral diversity and coverage,

evaluate the status of these coral reefs using reef check protocol and quantify the presence and prevalence of coral bleaching.

The study was carried in the two years 2016 and 2017 at 43 sites for different areas extended from north to south of Sudanese coast using (UVC) Underwater Visual Census and then analysis video sections.

The method used to analyse the video, the Reef Check to study coral reefs and some mathematical equations were used to find the Shannon diversity, Evenness index and Richness index.

For two years the results showed differences and diversity between sites. The average of hard coral was 38.01% and the average of soft coral was 6.04%. The average percentage of live cover for two years was 43.9% and the dead cover was 56.1%. During the study period a total of 40 genera of hermatypic corals belonging to 15 families they were: Acroporidae (4 genera), Faviidae (11 genera), Pocilloporidae (3 genera), Poritidae (2 genera), Dendrophylliidae (1 genus), Fugiidae (2 genera), Merulinidae (1 genus), Milleporidae (1 genus), Mussidae (3 genera), Meandrinidae (1 genus), Trachyphlliidae (1 genus), Pectiniidae (3 genera), Agariciidae (3 genera) Sclerastreidae (2 genera), Oculinidae (2 genera).

The average of Shannon diversity index, Evenness index and Richness index were (1.71, 1.73 and 8.83) respectively. Bleaching index was varied according to sites, average of bleaching number ranged from category: No bleaching (0), partially bleaching (1), white (2), bleaching and partly dead (3) and recently dead (4) were (58.5,

8, 19.5, 8 and 6) % respectively. Using at Chi² test no significant differences were appeared between 2016 and 2017 for live cover percentage and bleaching percentage.

The health status of the coral reefs in the Sudanese Red Sea is not seriously threatened as the legislated conservation.

مستخلص اطروحة مقدمة لنيل درجة الماجستير في علوم البحار
تقييم الحالة الصحية للشعاب المرجانية على طول ساحل البحر الأحمر السوداني

خديجة يوسف إبراهيم ابكر

نوفمبر 2021

المشرف الرئيسي: د. شيخ الدين محمد الأمين

المشرف المساعد: Dr. Kristy Nash

كلية الدراسات العليا

أجريت هذه الدراسة لتقييم الحالة الصحية للشعاب المرجانية على طول ساحل البحر الأحمر السوداني. هدفت الدراسة الى تأسيس قاعدة بيانات للدراسات المستقبلية، وتطور قاعدة البيانات الأساسية على مجتمعات الشعاب، التعرف على أنواع الشعاب المرجانية، توثيق التنوع الحيوي والغطاء الحي، تقييم حالة الشعاب المرجانية باستخدام Reef Check protocol وتحديد نسبة وجود وانتشار ابيضاض المرجان.

أجريت هذه الدراسة للعامين 2019- 2021م في 43 موقع ممتدة من الشمال الى الجنوب وذلك باستخدام التصوير والتعداد تحت الماء.

استخدمت في هذه الدراسة الدراسة لتحليل مقاطع الفيديو طريقة Reef Check لدراسة الشعاب المرجانية كما استخدمت بعض المعادلات الرياضية لمعرفة معامل التنوع، معامل التساوي ومعامل الثراء.

أظهرت النتائج على مدار العامين اختلافاً وتنوعاً بين المواقع، كان متوسط الشعاب المرجانية الصلبة 38.01% ومتوسط الشعاب المرجانية الرخوة 6.04% وبلغ متوسط نسبة الغطاء الحي لمدة العامين 43.9% والغطاء الميت 56.1%.

خلال فترة الدراسة تم التعرف على 40 نوع من الشعاب المرجانية تتبع الى 15 عائلة وهي:

Acroporidae (4) genera, Faviidae(11) genera, Pocilloporidae (3) genera, Poritidae(2) genera, Dendrophylliidae(1) genus, Fugiidae (2) genera, Merulinidae(1)genus, Milleporidae(1)genus, Mussidae(3) genera, Meandrinidae(1)genus, Trachyphlliidae(1)genus, Pectiniidae (3) genera, Agariciidae(3), genera Sidderastreidae(2) genera, Oculinidae(2) genera.

كان متوسط كل من معامل التنوع ، التساوي الثراء (1.71, 1.73, 8.83) على التوالي.

اختلف مؤشر ابيضاض الشعاب المرجانية باختلاف المواقع، حيث تراوح متوسط نسبة الابيضاض لكل من : (صفر) لا ابيضاض، (1) ابيضاض جزئي، (2) ببيضاء بالكامل، (3) جزئياً ميتة مع ابيضاض و (4) ميتة حديثاً حيث كانت النتائج % (58.5, 8, 19.5, 8, 6) على التوالي.

بناءً على ذلك فقد أوضحت الحالة الصحية للشعاب المرجانية على الساحل السوداني بأنها ليست في مرحلة خطرة وتقع ضمن قوانين الحماية.