

**SOCIO-ECONOMIC IMPACT OF COASTAL INSTABILITY AND  
BIODIVERSITY: A CASE STUDY OF VADDY HARBOUR IN  
KOLLAM DISTRICT**

*Dissertation submitted to the University of Kerala in partial fulfillment of the  
Bachelor of Arts Degree in Political Science*

Submitted by,

<b><u>Name of Students</u></b>	<b><u>Candidate code</u></b>
AKASH MOHAN	14521132020
ARCHANA J.	14521132005
CHANDNI S.	14521132037
FATHIMA H.	14521132038
GAYATHRI S.	14521132039

**Course Code: PS1645**



**PG & RESEARCH DEPARTMENT OF POLITICAL SCIENCE,  
SREE NARAYANA COLLEGE, KOLLAM**

**APRIL 2024**

## **DECLARATION**

We hereby declare that the BA Degree Dissertation entitled, “SOCIO-ECONOMIC IMPACT OF COASTAL INSTABILITY AND BIODIVERSITY: A CASE STUDY OF VADDY HARBOUR IN KOLLAM DISTRICT” is an independent work carried out by us and it has not been submitted anywhere else for any other degree, diploma or title.

KOLLAM

18-04-2024

**AKASH MOHAN (14521132020)**

**ARCHANA J. (14521132005)**

**CHANDNI S. (14521132037)**

**FATHIMA H. (14521132038)**

**GAYATHRI S. (14521132039)**

## **CERTIFICATE**

This is to certify that the work embodied in the dissertation entitled “**SOCIO-ECONOMIC IMPACT OF COASTAL INSTABILITY AND BIODIVERSITY: A CASE STUDY OF VADDY HARBOUR IN KOLLAM DISTRICT**” has been carried out by Akash Mohan, Archana J, Chandni S, Fathima H, and Gayathri S under my supervision and guidance. No part of the dissertation has been submitted to any other degree before.

**Dr. ARCHA ARUN**  
(Head of the Department)

**Dr. PRAJEESH P. P**  
(Supervising Teacher)

## **ACKNOWLEDGEMENT**

We are glad to express our profound gratitude to all those who have contributed directly or indirectly to the successful completion of this thesis. We acknowledge with thanks the kind of patronage, loving inspiration and timely guidance which we have received from our Supervising teacher, Dr. Prajeesh P.P

Our sincere thanks to Dr. Archa Arun (Head of the Department) and other faculty members of the Department of Political Science, Sree Narayana College, Kollam, for their valuable help and encouragement in the successful completion of the dissertation work. We express our deep sense of gratitude to the Librarian Sree Narayana College, Kollam.

Special thanks to our classmates, friends and family members for their valuable help and encouragement in the successful completion of this work.

**AKASH MOHAN**

**ARCHANA J.**

**CHANDNI S.**

**FATHIMA H.**

**GAYATHRI S.**

## CONTENTS

- **Abbreviations**
- **List of Tables**
- **List of Figures**

<u>Chapter No.</u>	<u>Chapters</u>	<u>Page No</u>
1	RESEARCH DESIGN	1
2	THEORETICAL FRAME WORK	8
3	HISTORICAL BACKGROUND	13
4	SOCIO ECONOMIC IMPACT OF COASTAL INSTABILITY	17
5	EFFECTS OF FISHERIES ON MARINE BIODIVERSITY	27
6	DATA COLLECTION & DATA ANALYSIS	38
7	CONCLUSION	43
	BIBLIOGRAPHY	49
	APPENDIX	52-57

## **ABBREVIATIONS**

- ALDFG - Abandoned, Lost or otherwise Discarded Fishing Gear
- FAO - Food and Agriculture Organization
- GDP - Gross Domestic Product
- GESAMP - Group of Experts on Scientific Aspects of Marine Pollution
- LAU's - Local Administrative Units
- MPA's - Marine Protected Areas
- NRC - National Register of Citizens
- PHC - Primary Health Centre
- TNT - Trinitrotoluene
- UDHR - The Universal Declaration of Human Rights
- UNEP - United Nations Environment Programme
- UNESCO - United Nations Educational, Scientific and Cultural Organisation

## LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page No.</u>
6.1	Gender Distribution	38
6.2	Age Distribution	38
6.3	Educational Level	39-40
6.4	Average Monthly Income	39-40
6.5	Men`s Occupation Patterns	40-41
6.6	Working Hours of Fisherman	40-41
6.7	Health Status	41-42
6.8	Women`s Employment Status	41-42
6.9	Waste Disposal Practices	42

## LIST OF FIGURES

<u>Table No.</u>	<u>Title</u>	<u>Page No.</u>
6.1	Gender Distribution	38
6.2	Age Distribution	38
6.3	Educational Level	39-40
6.4	Average Monthly Income	39-40
6.5	Men`s Occupation Patterns	40-41
6.6	Working Hours of Fisherman	40-41
6.7	Health Status	41-42
6.8	Women`s Employment Status	41-42
6.9	Waste Disposal Practices	42

# **CHAPTER - I**

## **RESEARCH DESIGN**

### **Introduction**

Coastal areas are local administrative units that are bordering or close to a coastline. A coastline is defined as the line where land and water surfaces meet. The term coastal is used to refer to things that are in the sea or on the land near a coast. The coastal environment is the area lying at the interface between the land and sea. Kerala is considered as a coastal State. Kollam is one of the best seaside tourist destinations in Kerala. Kollam is known as the Prince of the Arabian Sea. Vaddy is one of the top fishing harbours in Kollam, Kerala after Neendakara fishing Port. It's home to a large settlement of fisherman communities whose main livelihood is from the Arabian Sea. Vaddy constitute a very good population and also their main source of livelihood was fishing. The residents of Vaddy village are economically very poor.

Though the entire coastal line of Kollam has Fishermen settlements, the majority of them are settled near to the Vaddy and Thangassery regions and it makes Vaddy one of the top fishing destinations in Kerala. The many highlights and tourist spot of Kollam district were situated near Vaddy.

socio-economic disparities are very wide in the Vaddy area. The residents of Vaddy Harbour face lots of problems. Those socio-economic problems faced by the residents of coastal areas is of particular importance since many coastal communities are among the poorest on Earth and rely on coastal ecosystems to provide food and work. The social and economic factors have a massive impact far beyond the regions in question, as do the environmental ramifications of coastal and marine ecosystems. The coastal areas are already facing the consequences of climate change. Much of our fishing industry relies on coastal marshes that will disappear as sea levels rise, reducing the undeveloped areas between the sea and the built environment. Researchers are hard at work trying to understand the social and economic risks of tsunamis, flooding, droughts, severe storms, and population and development pressures. Apart from that effects of fisheries on marine biodiversity is a fundamental issue. Fishing has several direct effects on marine ecosystems because it is Responsible for increasing mortality of target and by-catch species; an important physical impact on the habitat of benthic organisms is caused by bottom trawling.

## **Statement of Problems**

The statement of the problem faced by the residents and biodiversity of the Vaddy coastal area are of the following:

- **Natural disasters:** The coastal areas like Vaddy are prone to natural disasters like tsunamis, which can cause significant damage to infrastructure and livelihoods.
- **Unemployment:** As like many other regions, this particular place also grapples with unemployment, particularly among the youth as there is a lack of education.
- **Healthcare:** Access to quality healthcare and addressing public health issues are ongoing concerns.
- **Economic disparity:** There are economic disparities within the Vaddy coastal areas as most of the residents are on to fishing activities and thereby facing greater challenges in accessing opportunities for growth and development.
- **Migration:** At times of natural disasters, they are forced to migrate from their own places.
- **Unhygienic:** A large number of people will reside in a single place. Hence, they will be vulnerable to disease.
- **Pollution:** Food wastes and oils from households and ships correspondingly will be dumped into the sea that can cause pollution.

## **Scope of the Study**

The scope of the study is wide as it deals with the socio-economic problems faced by the residents of the Coastal area. It broadens the understanding of issues faced by the residents of the Coastal area. The study also concentrated the threats faced by the Coastal communities including extreme natural events and also by the factor of human activities in Coastal areas. The socio-economic impact of Coastal instability threatens on biodiversity was also the major area under the study. The residents of the Coastal area have various problems related to housing, goods and services. The economic hardship faced by the residents of the Coastal area was also an important area of study. Such conditions accordingly require proper management and resolutions.

The study on the socio-economic problems faced by the residents of coastal areas is of particular importance since many coastal communities are among the poorest on Earth and rely on coastal ecosystems to provide food and work. The social and economic factors have a massive impact far beyond the regions in question, as do the environmental ramifications of

coastal and marine ecosystems and coastal areas are already facing the consequences of climate change. Much of our fishing industry relies on coastal marshes that will disappear as sea levels rise, reducing the undeveloped areas between the sea and the built environment. Researchers are hard at work trying to understand the social and economic risks of tsunamis, flooding, droughts, severe storms, and population and development pressures. Studying coastal instability and biodiversity is of utmost importance. Coastal areas are home to a wide variety of plants, animals, and ecosystems that rely on a delicate balance to thrive.

Understanding the impact of coastal instability, such as erosion and sea level rise, on biodiversity is crucial for conservation efforts and sustainable management. By investigating how these changes affect the distribution and abundance of species, we can develop effective strategies to mitigate the negative impacts and protect these valuable ecosystems. Plus, by preserving biodiversity, we ensure the resilience and stability of coastal communities and their economies. It's a fascinating field of study with far-reaching implications for both the environment and human well-being.

### **Objectives of the Study**

1. To identify the socio-economic conditions of the people of the coastal areas of Vaddy.
2. To analyse the gender inequality that exists in the coastal areas concerning the total population.
3. To examine the health care facilities and the quality of education in the remote coastal areas of Vaddy.
4. To identify policies to overcome the Socio-economic problems of residents of coastal areas.
5. To identify the effects of fisheries on marine biodiversity.
6. To study the impact of coastal erosion on the diversity of marine species.

### **Hypotheses of the Study**

The main objectives of this project are to explore the socio-economic conditions, the inequality, the health care and education, and the policies for coastal areas development. The hypothesis proposed for “Socio-economic problems faced by residents of coastal areas of Vaddy” are as follows:

1. The socio-economic conditions of the people of the coastal areas of Vaddy are significantly different from those of the inland areas and are influenced by factors such as climate change, environmental degradation, marine plastic pollution, etc.
2. Livelihood challenges, due to overfishing, pollution, and changes in marine ecosystems, negatively influence the socio-economic fabric of coastal communities.
3. Social inequality significantly influences access to education, healthcare, and employment opportunities in coastal regions.
4. The coastal residents of Vaddy have low awareness and participation in the existing policies and programs that aim to address the coastal issues and improve their livelihoods.

## **Importance of the Study**

The study on the socio-economic problems faced by the residents of coastal areas is of particular importance since many coastal communities are among the poorest on Earth and rely on coastal ecosystems to provide food and work. The social and economic factors have a massive impact far beyond the regions in question, as do the environmental ramifications of coastal and marine ecosystems. And coastal areas are already facing the consequences of climate change. Much of our fishing industry relies on coastal marshes that will disappear as sea levels rise, reducing the undeveloped areas between the sea and the built environment. Researchers are hard at work trying to understand the social and economic risks of tsunamis, flooding, droughts, severe storms, and population and development pressures.

## **Research Questions**

1. What are the social problems faced by residents of Vaddy?
2. What are the economic problems faced by residents of Vaddy?
3. Does Climate affect the life of people living in Vaddy?
4. Why do people living in coastal areas have different cultural differences than other people?
5. As citizens of a free nation in a democracy, do they have a role, beyond that of a voter, in local government?

## **Methodology**

The methodology is very important to research. The first step used in the data collection includes; primary data collection, conducting a field survey, and using sampling techniques which is based on interviews with the residents of the Coastal area.

The literature review of existing literature also provides the foundation for our study and helps to understand the socio-economic problems. The collected data are analysed using appropriate statistical techniques and qualitative methods. Secondary data was used to collect data such as newspapers, media reports, and articles.

## **Review of Literature**

The 1st edition of 'Coast for People, Interdisciplinary Approaches to coastal and Marine Resource Management' (Fikret Berkes,2015) describes about the issues of sustainability and increased competition over coastal resources management. Societal concerns about environmental degradation and loss of coastal resources have steadily increased, while other issues like flood security, biodiversity, and climate change have emerged.

In the study of Coastal population and Waste management by Jerry R Schubel discuss on the major problems faced by the coastal zone throughout the year. The Joint Group of Experts on Scientific Aspects of Marine Pollution (GESAMP,1991) pointed out that while human fingerprints are found throughout the world ocean, the open ocean is still relatively clean.

The article on the Issues of the coastal area in Kerala (jositeena,2015) depicts as population in coastal areas increases and the economic activity diversifies, all the impacts on coastal environment are bound to worsen threatening the survival of several species. A Systematic Review of the socio-economic Factors that Influence How Marine Protected Areas Impact on Ecosystems and Livelihoods by Me'ira Mizrahi, Amy Diedrich, Rebecca Weeks & Robert L Pressey describes Marine Protected Areas (MPAs) are among the most widely accepted methods of marine management. Marine Protected Areas (MPAs)are not, however, always placing such that they can maximize impact on conservation and livelihoods.

An article on Avoiding “Paper Parks”: A Global Literature Review on Socio-economic Factors Underpinning the Effectiveness of Marine Protected Areas by Antonio Di Cintio , Federico Niccolini, Sara Scipioni and Fabio Bul ;Marine Protected Areas (MPAs) are a common management tool for preserving marine biodiversity and halting resource depletion. Despite the number of Marine Protected Areas (MPAs) rapidly increasing worldwide, there are concerns over the full achievement of their objectives. Indeed, in some cases—the phenomenon of so-called “paper parks”—protected areas fail to achieve their conservation and socio-economic targets.

A south Asian Anthropologist, 2016, 1-6 New Series Studies on Vulnerability in Coastal Areas: A Review from Analytical Perspective by SOHELA MUSTARI† & A.H. M. ZEHADUL KARIM. Made review based on existing literature, this paper, explores the vulnerability of the coastal people. The reviewed literature emphasized that vulnerability is a kind of uncertainty arising mostly from natural disasters which are different and multifarious. It discovered that the prevailing literature dealing with vulnerability of coastal people, irrespective of the cultures and the countries are unique in nature, and thus it may also be different in different parts of the same country. The article on the effect of coastline changes to local community ‘s social economic by Muhammad imzaz and Nurul Hazira conveys Federal department of the town and country planning peninsular Malaysia has guidelines through conservation and development of environmental sensitive areas.

A Literature review of climate related coastal risks in the Mediterranean, a climate change hotspot by Nabanita Sarkar and Angela Rizzo describes that the direct and indirect impacts of climate change are alarming in the coastal areas of the world.

Extreme events are likely to increase the coastal risks in the region resulting in a significant socio-economic impact, loss of natural biodiversity and ecosystem service and damage to cultural heritage along the affected coasts Coastal protection measures: A review paper by Ali Masria states the protection measures worldwide are reviewed and divided mainly into four groups hard, soft, combined, innovative measures.

## **Chapterization**

**Chapter I** - Research design; The topic to be discussed is the Socio-economic problems faced by the residents of coastal areas and biodiversity of Vaddy village in Kollam district. It includes the objective, significance and methodology

**Chapter II** - Theoretical framework

**Chapter III** - Historical background; In ancient India, coastal India spans from the south west Indian coastline along the Arabian sea from the coastline of the Gulf of Kutch in its westernmost corner and stretches across the Gulf of Khambhat, and through the Salsette Island of Mumbai along the Konkan.

**Chapter IV** - Socio-economic impact of coastal instability; It conveys the problems faced by the residents like disparity, Health etc. Community aspects like sanitation, water, health, education waste disposal and so on. The economic view contains the wealth, financial stability, unemployment etc.

**Chapter V** - Effects of fisheries on marine biodiversity; The loss of marine biodiversity is weakening the ocean ecosystem and its ability to withstand disturbances, to adapt to climate change and to play its role as a global ecological and climate regulator.

**Chapter VI** - Data interpretation/ data collection and analysis

**Chapter VII** - Conclusion, findings, suggestions

## **Reference**

1. "*Coastal Zone Management in Kerala: A Socio-Economic Analysis*" by K. R. Viswanathan.
2. "*Coastal Zone Management in Kerala: A Study of Socio-economic and Environmental Perspectives*" by M. K. Prasad.
3. "*Coastal Zone Management in Kerala: Issues and Challenges*" by K. V. Thomas.
4. [www.coastallife.net.au](http://www.coastallife.net.au)
5. [www.thegef.org](http://www.thegef.org)

## **CHAPTER - II**

### **THEORETICAL FRAMEWORK**

#### **Concepts**

In research, the term "concept" refers to an abstract or general idea that is being studied or investigated. It represents a key aspect or variable that researchers want to understand, measure, or explore. Concepts in research are often defined and operationalized to ensure clarity and consistency in data collection and analysis. They help researchers frame their research questions, design their studies, and interpret their findings. They provide a framework for organizing and interpreting information.

#### **Rights**

Rights are legal, social, or ethical principles of freedom or entitlement; that is, rights are the fundamental normative rules about what is allowed of people or owed to people according to some legal system, social convention, or ethical theory.

#### **Human Rights**

Human Rights are a set of individual and collective rights that have been formally protected by International and domestic law since The Universal Declaration of Human Rights (UDHR), 1948. Human Rights are certain essential conditions for social and political life of man. Human Rights are fundamental rights and freedoms that every person is entitled to, regardless of their nationality, race, gender, or religion. These rights include the right to life, liberty, and security, freedom of speech and expression, and the right to be treated with dignity and equality. Human Rights serve as a foundation for a just and fair society, promoting peace, justice, and equality for all. It is important to respect and protect these rights to create a world where everyone can live with freedom and dignity.

#### **Civil Rights**

Civil rights are the basic rights and freedoms that are granted to individuals by the government. These rights include the right to vote, the right to equal treatment under the law, and the right to express oneself freely. Civil rights movements have played a crucial role in history, fighting for the rights of marginalized groups and challenging discrimination and

inequality. The struggle for civil rights has led to significant progress in ensuring equal opportunities and protections for all individuals, regardless of their race, gender, or background. It is important to continue advocating for civil rights to create a society where everyone is treated with fairness and respect.

### **Political Rights**

Political rights are an essential part of democratic societies. They refer to the rights and freedoms that allow individuals to participate in the political process, such as the right to vote, the right to run for office, and the right to express political opinions. These rights ensure that citizens have a voice in shaping their government and policies. By exercising political rights, individuals can influence decision-making, hold their leaders accountable, and contribute to the development of their communities. Protecting and promoting political rights is crucial for upholding democracy and ensuring a fair and inclusive society for all.

### **Economic Rights**

Economic rights are an important aspect of ensuring a just and equitable society. They encompass the rights of individuals to have access to basic necessities, such as food, shelter, healthcare, and education. Economic rights also include the right to fair wages, safe working conditions, and the ability to participate in the economy without discrimination. These rights are crucial for reducing poverty, promoting social welfare, and creating opportunities for individuals to thrive. By guaranteeing economic rights, we can work towards building a society where everyone has the chance to live a dignified and fulfilling life.

### **Fundamental Rights**

Fundamental rights are the basic rights and freedoms that are inherently granted to every individual, regardless of their background, identity, or status. These rights are essential for the protection and dignity of individuals and form the cornerstone of a just and equitable society. One of the most fundamental rights is the right to life, which ensures that every person has the inherent right to live and be protected from harm. This right encompasses not only physical safety but also the right to be free from torture, cruel treatment, or degrading punishment. Another crucial fundamental right is the right to liberty and security of person. This right guarantees that individuals cannot be arbitrarily detained or imprisoned, and that they have the freedom to move, live, and express themselves without unwarranted interference. Freedom of expression is a vital fundamental right that allows individuals to voice their

opinions, thoughts, and ideas without fear of censorship or retribution. This right is essential for fostering a vibrant democracy, encouraging diverse perspectives, and promoting social progress.

Equality and non-discrimination are fundamental rights that ensure that individuals are treated fairly and without prejudice. These rights prohibit discrimination based on factors such as race, gender, religion, nationality, or disability, and promote equal opportunities and access to resources for all. The right to education is a fundamental right that empowers individuals with the knowledge and skills necessary for personal development and active participation in society.

Education is not only a means to acquire knowledge but also a tool for social mobility and empowerment. In conclusion, fundamental rights are the bedrock of a just and inclusive society. They protect individuals from abuse, discrimination, and oppression while fostering dignity, equality, and freedom. Upholding and respecting fundamental rights is essential for creating a world where every person can live with dignity, equality, and the opportunity to fulfil their potential.

### **Theoretical Debate**

In order to have a comprehensive understanding of human rights, a look at the various theories becomes necessary to observe the shifting of priority of rights during the different phases of history. These theories provide the basis to determine the precise subject matter upon which there could be an agreement. An incisive insight into the major theories of rights is as follows:

#### **The Theory of Natural Rights**

This is the earliest theory of rights. Its origin can be traced back to the ancient Greeks. According to this theory, rights belong to the man by nature and thus are self-evident truths. They are considered as inborn absolute, pre-civil and pre-social. They can be asserted anywhere and everywhere. Thomas Paine, Grotius, Tom pane and John Locke, to name a few, are the main exponents of this theory. These theorists derived their ideas about rights from God, reason or a prior moral assumption. To them, every individual possesses a unique identity and is expected to account his actions as per his own conscience.

However, the critics of the natural rights theory argue that rights are not abstract, absolute, unidentified phenomenon. Liberty, as they argue, lives within restraints.

So, restraints upon rights create social conditions where everyone has ashore to develop his personality and correspondingly has his obligations to others. Rights and obligations, in fact, are the two sides of the same coin. Despite the above shortcomings, the theory of natural rights inspired the idea that any kind of unjust, arbitrary or oppressive treatment to human beings is an assault upon humanity itself. Apart from this, it also provided the basis, for the English, French and American revolutions, thereby resulting in the Bill of Rights.

### **The Legal Theory of Rights**

This theory is a reaction against the theory of natural rights. Advocates of this theory argue that the ideas of natural law and natural rights are abstract and ridiculous phenomena. Hence, the existence and enjoyment of fundamental rights of an individual could be better maintained and practiced by the state rather than by the individual himself. Thomas Hobbes, John Austin and Jeremy Bentham are the main proponents of this theory. According to them, rights are purely utilitarian concepts and thus the rule and regulations are necessary for identification and protection of one's rights. Towards this end, every individual has to sacrifice certain rights and freedoms for the general welfare of the society.

This theory has been severely criticized on the ground that law alone does not create rights. Rather, it recognizes and protects them. Customs, traditions and morality also have a basis for rights. However, the truth in this theory lies in the fact that it enables individuals to demand certain specific and recognized rights as granted and guaranteed by the state.

### **The Legal Realist Theory of Rights**

The Legal Realist Theory of Rights is of recent origin. It mainly originated in U.S.A. with the expansion of regulatory activities followed by President Roosevelt's "New Deal Policy." A group of jurists such as Karl Llewellyn, Roscoe Pound and others discussed the point as to what law does, rather than what law is, in a highly complex and industrialized society. These theorists did not propound a common theory of rights.

Rather, they considered rights as the end product of both the interaction of prevailing moral values of the society as well as broad-based international sharing of values. So human rights, as they argue, are nothing but a manifestation of an on-going process rather than a theoretical debate. This kind of a new approach to the concept of rights goes away with problems relating to abstract nature of concept.

However, this theory goes about questioning the existing laws, their values and actions, so far enacted upon society. In other words, it questions the shortcomings and ineffectiveness of the existing laws but does not prescribe any solution in the form of super-value of a human being.

## **Reference**

1. *"Human Rights: A Very Short Introduction"* by Andrew Clapham
2. *"The Human Rights Reader"* edited by Micheline Ishay
3. *"The Idea of Human Rights"* by Charles R. Beitz
4. [www.rcet.org.in](http://www.rcet.org.in)

## **CHAPTER - III**

### **HISTORICAL BACKGROUND**

#### **Introduction**

Kerala, a state on India's tropical Malabar Coast, has nearly 600km of Arabian Sea shoreline. It's known for its palm-lined beaches and backwaters, a network of canals. It was formed on 1 November 1956, Kerala is the 21st largest Indian state by area. It is bordered by Karnataka to the north and northeast, Tamil Nadu to the east and south, and the Lakshadweep Sea to the west. Kerala is the 13th-largest Indian state by population. It is divided into 14 districts with the capital being Thiruvananthapuram. Malayalam is the most widely spoken language and is also the official language of the state.

Coastal areas are local administrative units (LAU's) that are bordering or close to a coastline. A coastline is defined as the line where land and water surfaces meet. The term coastal is used to refer to things that are in the sea or on the land near a coast. The coastal environment is the area lying at the interface between the land and sea. The area includes both the zone of shallow water within which waves are able to move sediment and the area landward of this zone including beaches, cliffs and coastal dunes. An advantage of coastal developments is the economic gains that are generated because coastal areas are favoured areas for energy generation because of easy delivery of fuel for power stations and convenient disposal of cooling water. The landward part of the coastal zone plays an important role as a place for human settlement and tourism.

The coastal habitats include estuaries, coastal wetlands, seagrass, meadows, coral reefs, mangrove forests, kelp forests and upwelling areas. India has a very long coastline and it measures about 7,516.6km bordering the mainland and the islands with the Bay of Bengal in the East, The Indian Ocean on the South and The Arabian Sea on the West. The coastal states of India are Kerala, Tamil Nadu, West Bengal, Goa, Karnataka, Maharashtra, Andhra Pradesh and Odisha. The coastal regions of India are noted for agriculture, trade, industrial centres, fishing, and salt making. They provide important hinterlands for big ports. Many parts of the Indian coastal plains have rich, fertile soil on which, apart from rice, a large variety of crops are grown. Coasts have many different features such as caves and Cliffs, beaches. The coastal zone is used for fishing and aquaculture, energy production, housing, military purposes, leisure and tourism, water supply, wates treatment, transportation of goods ,and harbours and more.

## **Coastal Areas In Kerala**

Kerala is considered as a Coastal state. The term Malabar Coast also known as Kerala coast, in historical contexts, it refers to the India's southwestern coast, which lies on the narrow coastal plain of Karnataka and Kerala between the Western Ghats range and the Arabian Sea. The coast runs from south of Goa to Kanyakumari on India's southern tip. A substantial portion of the Malabar Coast including the western coastal lowlands and the plains of the midland may have been under the sea in ancient times. Marine fossils have been found in an area near Changanassery. Pre-historical archaeological findings include dolmens of the Neolithic era in the Marayur area of the Idukki district, which lie on the eastern highland made by Western Ghats. Rock engravings in the Edakkal Caves, in Wayanad date back to the Neolithic era around 6000 BCE. The Malabar Coast featured several historic port cities. Notable among these were/are Naura, Vizhinjam, Muziris, Nelcynda, Bepore and Thundi (near Ponnani or Kadalundi) during ancient times, and Kozhikode, Kollam, Ponnani, Kannur, and Cochin in the medieval period, and have served as centers of the Indian Ocean trade for millennia.

The term Kerala was first epigraphically recorded as Ketalaputo (Cheras) in a 3rd-century BCE rock inscription by emperor Ashoka of Magadha. It was mentioned as one of the four independent kingdoms in southern India during Ashoka's time, the others being the Cholas, Pandyas and Satyaputras. The Cheras transformed Kerala into an international trade centre by establishing trade relations across the Arabian Sea with all major Mediterranean and Red Sea ports as well those of the Far East. The dominion of Cheras was located in one of the key routes of the ancient Indian Ocean trade. The early Cheras collapsed after repeated attacks from the neighboring Cholas and Rashtrakutas.

## **Coastal Areas In Kollam**

Kollam is known as the Prince of Arabian Sea. Several beaches, estuaries, backwaters and islands are there in the city. In 2015, Kollam got selected as the least polluted city in India. The mineral sand deposit in Kollam coasts worth several thousand crores of Indian rupee. The city of Kollam lies at 8.887082°N 76.590691°E with an average altitude of 3 metres. The average rainfall is 270 cm yearly. The city is surrounded by Arabian Sea in the west, Ashtamudi Lake and panchayats of Neendakara and Thrikkaruva in north, Mayyanad panchayat in the south and Thrikkovilvattom and Kottamkara panchayats in east. The Kollam coast is a blessed coastal belt with the best mineral sand deposit of the country. The backwaters of Ashtamudi, thick mangroves on its coasts, beaches, estuaries, scattered islands and pleasant climate are

making Kollam as one of the best sea side tourist destinations in Kerala. Beaches in Kollam Popularly known Kollam Beach, Thirumullavaram Beach and Mundakkal Beach are the three important beaches in the city. Several other small beaches are there on the coastline of Kollam namely Tangasseri, Vaddy, Thanni etc. Kollam Beach is on the south-west area of the city.

### **Vaddy Coastal Area**

Vaddy is one of the top fishing harbours in Kollam after Neendkara fishing Port. Vaddy fisheries village is located at ward 50 of Kollam Corporation. The village has a approximate of 450 houses and 455 households are living there. Cent percent of the houses in the village are electrified. It is noted that 537 persons from the fisher folk community are insured with the Fisheries Board. Regarding the community specific facilities, this village has one Primary Health Centre (PHC). The village has one LP School and one UP School. Seven anganawadis are functioning in this village and three of them are functioning in own buildings. This village has a network of 4 roads of 5 Km length, 1 Km drainage and two culverts. The village has 130 street lights and 70 of them are functional. About the fisheries specific infrastructure and facilities, it is noted that 5 country fishing boats are available in this fisheries village. And a total of 3 kerosene permits are issued to the fisher folk.

The village has one fish landing centre. The village has two ice plants. The village has coastal line of 2.25 Km, out of which 2.00 Km is protected. Consumption of liquor and narcotic drugs are moderate in this village. The results of situation analysis and needs and financial requirements are presented in Tables 58 and 59. It's home to a large settlement of fisherman community. Vaddy constitute a very good population and also their main source of livelihood was fishing. The residents of Vaddy village are economically very poor.

Though the entire costal line of Kollam has Fishermen settlements, majority of them are settled near to the Vaddy and Thangassery regions and it makes Vaddy one of the top fishing destination in Kerala. The many highlights and tourist spot of Kollam district were situated near Vaddy socio- economic disparities are very wide in Vaddy area, illiteracy was also another problem also the male members of the family constitute to working people females are note much engaged in works. The changes in climatic conditions also make problems to the residents of Vaddy area. Vaddy is also a well-known exporter.

## **The Road Project**

A detailed plan for constructing a four-lane road to connect century-old Port of Quilon with Kollam city was first suggested by P. K. Gurudasan, the then Labour minister of Kerala state, in 2007. V. S. Achuthanandan lead LDF ministry had sanctioned fund in 2009-2010 Kerala budget, to take over 71.5 cents of land from Kochupilammoodu bridge road to the Port Road from private parties and also sanctioned Rs.2.43 crore for road construction works. On 16 February 2016, the site was transferred for construction and the works completed on 2016 December 31. The road was inaugurated by Kerala Port Minister Kadannappalli Ramachandran on 19 September 2017. The first phase of the road, between Vaddy and Kollam Port had been completed in 2010. The total estimated project cost including phase-II is Rs.13.52 crores.

The four-laning works have completed in a 1.7 km stretch between Thangassery Bus Terminal and Kollam Port. From Kollam Port to Vaddy Kadappuram 600 metres of this road is yet to be widened. The four-laning works remaining 500 metre stretch of the road from Vaddy Kadappuram till Kochupilammoodu bridge near Kollam Beach is also completed. However, in-order to make the freight movement to the port from National Highway 66 (India), National Highway 744 (India), National Waterway 3 easier widening and four laning of Thangassery Bus Terminal - Ammachiveedu - Vellayittambalam - Kavanad road, Kochupilammoodu -Kappalandimukku - Mevaram Kollam Inland Port Asramam - Kappalandimukku road and dredging and improvement on Kollam Canal from Kollam Inland Port Asramam till Kochupilammoodu are necessary.

## **Reference**

1. [www.britannica.com](http://www.britannica.com)
2. [www.researchgate.net](http://www.researchgate.net)
3. [www.wikipedia.com](http://www.wikipedia.com)

## CHAPTER – IV

### SOCIO- ECONOMIC IMPACT OF COASTAL INSTABILITY

#### Introduction

Coastal instability can have significant socio-economic impacts on the communities living in those areas. Erosion and sea-level rise can threaten homes, infrastructure, and livelihoods, especially for those who rely on fishing or tourism. Displacement of coastal communities due to these factors can lead to social and economic challenges, including loss of traditional occupations and cultural heritage. Additionally, the increased frequency and intensity of storms and natural disasters in coastal areas can further exacerbate these impacts. Governments and communities need to implement measures to mitigate and adapt to coastal instability to ensure the well-being and resilience of coastal communities. (Lakshmi A & Rajagopalan R.,2000)

To mitigate coastal instability, several common measures can be taken. One approach is the construction of coastal defences such as seawalls, breakwaters, or groynes to protect against erosion and storm surges. Beach nourishment, which involves adding sand to eroded beaches, can also help stabilize the coastline. Another strategy is the implementation of coastal zone management plans that regulate development and land use in vulnerable areas. Additionally, promoting natural solutions like restoring coastal wetlands and dunes can provide natural buffers against erosion. These measures, when implemented effectively, can help protect coastal communities and preserve their socio-economic well-being. According to a report by UNESCO (United Nations Educational, Scientific and Cultural Organization), coastal erosion in Eastern Africa, more so along the Kenya coastline has received little attention from researchers (Mwanje, 1997). Over the years the problem has become increasingly serious. In addition, it has been noted that there is inadequate knowledge of its effects on natural resources as well as the lives of the local communities.

The report established those local communities and fishermen base their knowledge of coastal physical changes on observations and experience. They appear to be more knowledgeable in this regard than decision-makers. Indeed, the cited effect of coastal erosion included the decrease of agricultural land, destruction of coastal properties and reduced fish catches.

It emerged that the most common mitigating action taken by coastal communities is the planting of vegetation, while some hotel establishments erected seawalls along the shoreline. In retrospect, most respondents observed that the role of government was very low and that integrated efforts with local communities could be useful in combating the effects of coastal erosion. Hence, there is need to develop proper interventions for sustainable coastal resource utilization.

In addition, coastal erosion may lead to a variety of negative economic impacts. These can range from lost or damaged property or land to negative effects on tourism, shipping, trade, fishing, and other industries. The threat of erosion also prevents developers from creating new buildings or infrastructure in some coastal areas

### **Social Status of People in Coastal Areas**

The social conditions of people living in the coastal areas can vary depending on the specific location. In some coastal areas, people rely heavily on fishing and maritime industries for their livelihoods. Others may have a more tourism-driven economy. Coastal communities often have a strong connection to the sea and a unique culture that revolves around it.

In coastal areas, the social status of people can vary depending on various factors such as education, occupation, and access to resources. In some cases, fishing communities may have a distinct social structure and cultural practices that revolve around their livelihoods. Tourism can also play a role in shaping the social dynamics of coastal areas, with opportunities for employment and economic growth. It's important to note that social status is a complex and multifaceted concept that can differ from community to community. Living in coastal areas can bring about diverse social conditions for the people residing there. Coastal communities can experience a range of social factors, including:

- **Close-knit communities:** Coastal areas often foster tight-knit communities where people have strong bonds and a sense of belonging. Living close to one another and sharing a common reliance on the sea can create a strong community spirit.
- **Reliance on natural resources:** Many coastal communities depend on the ocean for their livelihoods, such as fishing or maritime trade. The availability and sustainability of these resources can influence the social conditions of these communities.

- **Tourism and cultural exchange:** Coastal areas that attract tourists provide opportunities for cultural exchange and economic growth. The presence of tourists can lead to a vibrant social scene, increased job opportunities, and exposure to different cultures and perspectives.
- **Vulnerability to natural disasters:** Coastal areas are often more susceptible to natural disasters like hurricanes, tsunamis, or coastal erosion. These events can have a significant impact on the social conditions of the people living there, leading to displacement, loss of livelihoods, and changes in community dynamics.
- **Access to healthcare and services:** The social conditions of coastal communities can be influenced by the availability and accessibility of healthcare facilities, educational institutions, and other essential services. Remote or isolated coastal areas may face challenges in accessing these services.

It's Important to recognize that social conditions can vary greatly among different coastal areas and communities. Factors such as economic development, infrastructure, education, and government support play a role in shaping the social conditions of people living in coastal areas.

### **Social Conditions of Vaddy**

In Vaddy, Kollam district of Kerala, the social dynamics of coastal areas are influenced by the close connection to the sea and the reliance on fishing as a primary livelihood. The community often has a strong sense of togetherness and a shared identity centred around their coastal heritage. Traditional practices and cultural events related to fishing are an integral part of their social fabric. Additionally, tourism plays a significant role, attracting visitors to the beautiful coastal landscapes and cultural heritage sites. This interaction with tourists can create opportunities for economic growth and cultural exchange. Overall, the social dynamics of coastal areas in Vaddy reflect a blend of traditional values, community resilience, and the influence of the coastal environment.

In Vaddy, the social status of individuals living in coastal areas can be influenced by various factors.

- **Occupational Diversity:** Many people in the coastal areas of Vaddy are engaged in traditional occupations like fishing and agriculture. These occupations have been passed down through generations and are deeply in the social fabric of the community.
- **Fishing Community:** Fishing is a significant part of the coastal economy, and the social status of individuals involved in fishing can be influenced by factors such as the size of their catch, their fishing techniques, and their reputation within the community.
- **Education and Literacy:** Access to education plays a crucial role in shaping the social status of individuals in coastal areas. Efforts to improve literacy rates and educational opportunities can contribute to upward mobility and social empowerment.
- **Infrastructure and Amenities:** The availability of basic amenities and infrastructure, such as clean water, sanitation facilities, and healthcare services, can impact the social status of people living in coastal areas. Access to these resources can contribute to an improved quality of life and social well-being.
- **Cultural Significance:** Coastal areas often have a rich cultural heritage, and individuals who actively participate in preserving and promoting their cultural practices may hold a higher social status within the community.

Social status is complex and multifaceted, and it can vary from person to person based on individual achievements, education, economic factors, and community dynamics.

### **Social Impact**

Coastal areas have a significant social impact on both the communities living there and the broader society. These impacts can include:

- **Economic opportunities:** Coastal areas often provide livelihoods through industries such as fishing, maritime trade, tourism, and coastal development. These industries create jobs and contribute to the local and national economy.
- **Cultural preservation:** Coastal areas are often rich in cultural heritage and traditions. The social impact of coastal areas includes the preservation and promotion of unique cultural practices, such as traditional fishing techniques, festivals, and art forms.

- **Community cohesion:** Coastal communities often have a strong sense of community and connection to the sea. The shared reliance on coastal resources and the challenges they face, such as natural disasters or environmental changes, can foster a sense of solidarity and cooperation among community members.
- **Environmental awareness:** Living in coastal areas can increase awareness and concern for environmental issues. Coastal communities often experience first-hand the impacts of pollution, climate change, and habitat degradation, leading to increased advocacy and conservation efforts.
- **Tourism and recreation:** Coastal areas attract tourists and visitors, contributing to the local economy and providing opportunities for cultural exchange. Tourism can also create jobs and support local businesses, positively impacting the social fabric of coastal communities.

The social Impact of coastal areas can also include challenges such as coastal erosion, displacement of communities due to development, and unequal access to resources. Balancing economic development, environmental conservation, and social well-being is crucial for sustainable coastal communities.

### **The Economic Status of People of Coastal Areas**

The coastal society can be categorized further into a specific type of community by considering the geographic – ecological, and economic characteristics including the social and cultural aspects that shape their specific characteristics. Moreover, their economic activities are closely related to their geographical and ecological conditions characterized by the utilization of coastal resources and services covering activities in fisheries, commerce, marine tourism and transportation.

Coastal regions are often abundant in natural resources, offering significant opportunities for various economic activities, particularly those based on resources like agriculture, fisheries, tourism, oil and gas extraction, and maritime transport. These industries tend to concentrate in coastal areas, given their strategic advantages. Additionally, coastal zones serve as significant hubs, attracting a substantial influx of immigrants with growing demands for housing, energy, goods, and services.

This scenario, however, leads to the over-exploitation of natural resources and the generation of substantial amounts of waste, which is often improperly disposed of in the environment. Consequently, coastal areas are experiencing escalating pressure, jeopardizing their crucial economic and social roles in supporting the well-being of both current and future generations (UNEP, undated).

The problems faced in the coastal area are the high poverty level, the high degradation level of coastal resources, and the low village and health infrastructure in the region.

Coastal regions serve as vital habitats for diverse species and ecosystems, offering numerous advantages to both society and the natural environment. The economic conditions of inhabitants in these areas exhibit considerable variability. In certain coastal locales, robust economies flourish, particularly those designated as sought-after tourist destinations or bolstered by thriving industries such as fishing and shipping. Nevertheless, these regions are not without challenges, including elevated living expenses, fluctuations in employment tied to seasonal factors, and constraints on job availability.

The residents of coastal areas have a unique standard of living, and the economic status of the coastal community is complex. The economic condition of people living in coastal areas also depends on their specific location. In some areas, people are dependent on fishing, while others rely on various occupations such as mechanic work, tailoring, housemaids, and other industrial activities.

Kerala faces multiple challenges due to coastal instabilities. The state has a large fisher community, most of whom belong to the downtrodden and vulnerable groups. The state's fisheries sector contributes 1.58% to the state GDP during the year 2017-2018. Following Thiruvananthapuram, Kollam district is another crucial coastal region.

### **Economic Conditions of Vaddy**

Vaddy is one of the top fishing harbours in Kollam after Neendakara fishing Port. The residents of the Vaddy area are economically backward. Illiteracy was also another major problem that led to economic hardships, and most of the male members are working people whereas females didn't constitute as much compared to men most of them were homemakers.

Coastal instabilities also have adverse impacts on the socio-economic development of the State as they affect income, employment, food security, health, education, and social welfare of the Coastal community.

### **Economic Impact**

The main economic problem faced by the Coastal communities is unemployment. Dependence on fishing may sometimes fail due to seasonal variations, illiteracy, and lack of women empowerment. Debt trap was also another important problem faced by the Coastal communities, lack of assets was also another important problem.

Living in coastal areas can present some economic challenges for people. One major issue is the high cost of living, as housing and property prices tend to be higher in these areas. Additionally, coastal communities often rely heavily on industries such as fishing and tourism, which can be vulnerable to fluctuations and seasonal variations. Natural disasters, such as hurricanes or coastal erosion, can also cause significant economic hardships for residents, leading to property damage and loss of livelihoods. Coastal communities need to implement strategies to diversify their economies and build resilience to overcome these challenges. Coastal instability can have a significant economic impact. It can lead to erosion, which can damage infrastructure like roads, buildings, and ports. It can also affect tourism and fishing industries, which rely on stable coastlines.

The cost of repairing and mitigating the effects of coastal instability can be quite high. Coastal areas are vulnerable to natural disasters like storms, tides, tsunamis, hurricanes, or flooding, which can cause extensive damage to homes, businesses, and infrastructure. The high cost of insurance in coastal regions due to the increased risk of property damage is another issue. Additionally, coastal areas heavily reliant on tourism may experience fluctuations in revenue due to factors like weather conditions or seasonal variations. These economic problems require careful planning and investment to ensure sustainable growth and resilience in coastal communities.

To address these challenges, coastal communities need to develop and implement comprehensive plans that take into account the unique characteristics of their region. These plans should include measures to reduce the risk of natural disasters, such as building sea walls or planting vegetation to prevent erosion. They should also consider the economic impact of coastal instability and develop strategies to mitigate these effects, such as

diversifying the local economy or investing in infrastructure that can withstand natural disasters. Additionally, coastal communities should work to increase their resilience to natural disasters by developing early warning systems and evacuation plans.

Investment in research and development of new technologies can also help coastal communities address these challenges. For example, new materials and construction techniques can be used to build more resilient infrastructure that can withstand the effects of coastal instability and natural disasters<sup>1</sup>. Furthermore, the use of renewable energy sources can help reduce the carbon footprint of coastal communities and mitigate the effects of climate change.

### **Major Challenges**

**Unemployment:** Unemployment is a big issue for people living in coastal areas. This problem often happens because some coastal places mainly depend on businesses that only operate during specific times, like tourism. So, when it's not the busy season, there are fewer jobs. Another problem is that there might not be enough different types of jobs in these coastal areas. This makes it hard for people to find steady work. To fix this, local governments and communities should try to bring in different kinds of businesses and create more job opportunities.

Also, many women in these areas are mostly seen as homemakers. This means they stay at home and take care of the family. To improve the situation, it's essential to encourage and provide opportunities for women to work outside the home if they want to. This way, they can contribute to the economy and have more choices in their lives.

**The lack of women empowerment in coastal areas:** In coastal areas, many women don't get the same chances to do well and succeed, especially when it comes to making money. It's crucial to make sure women have fair opportunities in every part of life, including jobs and businesses by the coast.

We need to support equality between men and women and make a place where women can join in and make a difference in the coastal economy. When we give power to women, we can unlock their abilities and help the whole community grow. Right now, many women in these areas don't have jobs, or they're stuck doing only household chores. Some who work as fish sellers also face problems like getting paid less, not having leadership roles, and dealing with unfair beliefs from society. It's important to change this and give women the chance to succeed in every way.

Seasonal variations: Seasonal variations present a substantial economic hurdle for coastal communities. These regions are highly sensitive to various environmental changes, including rising sea levels, shifts in storm frequency and intensity, increased precipitation, and elevated atmospheric carbon dioxide levels. These factors collectively threaten the economic stability of coastal areas, affecting industries such as fishing, tourism, and agriculture.

The rising sea levels can lead to coastal erosion, submerging valuable land and infrastructure. Changes in storm patterns and increased intensity can result in damage to homes, businesses, and vital infrastructure like ports and roads. Moreover, the heightened precipitation and atmospheric carbon dioxide concentrations can impact the overall ecosystem, affecting the availability of resources and further complicating economic activities.

Debt Trap: Beyond the environmental challenges, coastal communities also grapple with a pressing economic issue – the debt trap. Many residents in these areas lack significant assets and find themselves dependent on money lenders to meet their daily needs. This reliance on external financial support, often accompanied by high interest rates, can lead to a cycle of debt that hampers financial stability and inhibits long-term economic growth.

Thus, Coastal areas play a significant role in the economy, but their economic impact can vary. While some coastal regions thrive with strong industries and tourism, others face challenges such as seasonal fluctuations and limited job opportunities. Governments and communities must focus on promoting economic diversification, creating sustainable job opportunities, and addressing the specific needs of coastal areas. By doing so, we can ensure the long-term prosperity and well-being of coastal communities potential that these areas have to offer, while harnessing the economic potential that these areas have to offer.

## **Conclusion**

Coastal instability is a complex issue that has a profound socio-economic impact on communities. The livelihoods of people who rely on coastal activities like fishing and tourism are affected by coastal instability. Economic losses due to damage to infrastructure are also a major concern.

Displacement and relocation can disrupt social networks and cultural practices, leading to further challenges. Environmental impacts, such as habitat loss and pollution, further exacerbate the challenges.

To address these issues, a multi-faceted approach is required. Effective coastal management and community resilience are key in mitigating the impacts of coastal instability. By investing in infrastructure, raising awareness, and promoting sustainable practices, we can work towards minimizing the negative effects and supporting the well-being of coastal communities.

In addition, it is important to address the economic losses caused by coastal instability. This can be done by developing alternative livelihoods for those who rely on coastal activities. For example, promoting eco-tourism and sustainable fishing practices can help to reduce the impact of coastal instability on the livelihoods of coastal communities.

Furthermore, displacement and relocation can be minimized by developing early warning systems and disaster preparedness plans.

This can help to ensure that communities are better prepared to deal with the impacts of coastal instability. The socio-economic impact of coastal instability is a complex issue that requires a multi-faceted approach. By addressing economic losses, displacement, environmental impacts, infrastructure and coastal management, and community resilience, we can work towards minimizing the negative effects and promoting the well-being of coastal communities.

## References

1. "*Coastal risk management in a changing climate*" edited by Barbara Zanuuttigh, Robert. J Nicholls and Jean Paul Vandertinden.
2. "*The Human shore, Sea coasts in History*". By John R. Gillis
3. "*Coastal Zone management: Global perspectives, Regional process, Local Issues*". Edited by Rich and Burroughs
4. "*The Great Derangement: Climate Change and the Unthinkable*" by Amitav Ghosh.
5. [www.apn-gcr.org](http://www.apn-gcr.org)

## CHAPTER - V

### EFFECTS OF FISHERIES ON MARINE BIODIVERSITY

#### Introduction

Fishing is considered as the most widespread human exploitative activity in the marine environment. Pauly and Christensen (1995) estimated that over 20 % of the marine primary production is required to sustain fisheries in many intensively fished coastal ecosystems. Fishing has a number of direct effects on marine ecosystems because it is responsible for increasing mortality of target and by-catch species; an important physical impact on the habitat of benthic organisms is caused by bottom trawling. Effects of fishing on target species Global landing of fish and other marine catches began stagnating in the early 1980s. Biomass of large predatory fish species in the North Atlantic fell by 90 % during the twentieth century, leading to declines of catches throughout the North Atlantic, notably in eastern Canada. It has taken less than a century for North Atlantic fisheries to reduce the biomass of the high-trophic-level fishes to under 10% of their original amounts.

Historically, fishing started at the top of most food chains by removing the highly valuable and more easily catchable species, then moved down to the next biggest species as those above were depleted and were no longer easily or economically caught. The downward shift towards fish catches of lower trophic levels results in 'fishing down the food web'. The mean trophic level of reported catches had declined over the years. For all marine areas, the trend has been a decline in the mean trophic level of the fisheries landings from slightly more than 3.3 in the early 1950s to less than 3.1 in 1994. Another shift in the global landings of fishes in the last 50 years is from shallow to deeper water species; this resulted in the fact that the mean longevity of the fish species caught, has increased dramatically. This trend is a serious concern because species with larger body size, longer life span, later sexual maturity and slow growth (e.g. Dogfish *Scyliorhinus canicula*, Rays, Conger eel *Conger conger*) are more vulnerable to overfishing.

The direct effects of fishing have indirect implications for other species as well. Fisheries remove prey that piscivorous fishes, birds and mammals would otherwise consume,

or may remove predators that would otherwise control prey populations. Reductions in the density of some species may affect competitive interactions and result in the proliferation of non-target species. The activities of fisheries also favor scavengers, they obtain more food by the discarded by-catch and because a range of species are killed, but not retained by towed gears.

### **Effects of Trawling**

Bottom trawling can produce vastly different effects on different types of seabed sediment (such as sand, silt, or mud), each with different ecological consequences. Trawling destroys the natural seafloor habitat by essentially rototilling the seabed. All of the bottom-dwelling plants and animals are affected, if not outright destroyed, by tearing up root systems or animal burrows. Resuspending bottom sediment changes the entire chemistry of the water, including nutrient levels. Resuspended sediment can lower light levels in the water and reduce photosynthesis in ocean-dwelling plants, the foundation of the food web. The resuspended sediment is carried away by currents and often lost from the local ecosystem. It may be deposited elsewhere along the continental shelf, or in many cases, permanently lost from the shelf to deeper waters. Changing parts of the seafloor from soft mud to bare rock can eliminate those creatures that live in the sediment. Species diversity and habitat complexity are directly affected when trawling changes, the physical environment of sand, mud, or rock.

Trawl gear has a direct physical effect on the seabed wherever the ground rope, chains and bobbins, sweeps, doors, and any chaffing mats or parts of the net bag contact the bottom. Ways in which gear affects the seabed can be classified as: scraping and ploughing; sediment resuspension; and physical destruction, removal, or scattering of non-target benthos. The fishing operation further affects the seabed through waste dumped from the vessel. Indirect effects on the seabed are related to the stress imposed on the benthos. These effects include post-fishing mortality of damaged or disturbed organisms, and long-term changes to the benthos community structure.

### **Trawl Depletion**

Similarly, the results of a trawl depletion experiment in the inter reef areas of the Great Barrier Reef showed that each trawl removed and caught between 5 and 20% of the available biomass of sessile fauna, with 70-90% removed after 13 trawls. Bottom trawling is not limited to the shelf seas; this fishing method is also practiced on the deeper continental slope. An example are chronically trawled parts of the continental slope of the north-western

Mediterranean Sea, where important effects have been observed at depths between 200 and 800 m. These effects include significant decreases in organic matter content (up to 52%), slower organic carbon turnover (approx. 37%), reduced meiofauna abundance (80%), biodiversity (50%), and nematode species richness (25%). The authors caution that ultimately, intensive and chronic bottom trawling is deemed to transform large portions of the deep continental slope into faunal deserts and highly degraded seascapes.

### **Effects on by-Catch Species**

Benthic organisms and other unwanted by-catch are often discarded and a range of species are killed, but not retained by towed gears. Other exploitations like by-catch species have been affected dramatically by fishing. For example, the sizes of three dolphin populations (a *Stenella longirostris* population, an *S. attenuata* population, and a second *S. longirostris* population) caught by tuna boats in the eastern tropical Pacific were reduced to 20%, 35-50% and 58-72% of pre-exploitation levels by 1997. Physical, chemical and biological processes require more time for recovery (months-years). Slow-growing biota with large biomass, such as sponges and soft corals, take much longer to recover (up to 8 years) than biota with a shorter lifespan, such as polychaetes.

Chronic fishing disturbance affects the epifauna by modification of substrata and removal of biogenic concretions and a consequent decline in the abundance of fauna associated with them. The loss of biogenic species not only reduces the supply of important prey species, but also increases predation risk for juvenile commercial species thereby lowering subsequent recruitment to the adult stocks. Conversely, scavengers and small-bodied organisms, such as polychaeta worms, dominate heavily fished areas.

Major changes in habitat can lead to changes in the composition of the resident fish fauna. Changes attributed to the fisheries are also identified in the mesozooplankton composition. For instance, the mesozooplankton taken in continuous plankton recorder samples in the central North Sea were numerically dominated by calanoid copepods from 1958 to the late 1970s, whereas samples taken from the same stations from the early 1980s to early 1990s were dominated by the pluteus larvae of echinoid and ophiuroid echinoderms. This trend is consistent with the reported increases in the abundance of echinoderms in benthic communities which may have been stimulated, in part, by bottom trawling.

## **Effects of Seabed Disturbance**

It varies according to the gears used and the habitats fished. The heaviest damage is caused by scallop dredges, both deposit- and suspension-feeders are vulnerable to scallop dredging across gravel, sand and mud habitats, but biogenic habitats suffer most. Beam trawling can also be highly destructive, but this strongly depends upon habitat type. Static bottom gears are anchored to the seabed and left to fish passively. The most commonly used are gill, trammel or tangle nets, which are designed to capture target species by enmeshing or tangling them. Because net and pot fisheries are static, the areas of seabed affected by each gear is insignificant compared with the widespread effects of mobile fishing gears. However, effects may be significant if concentrated in relatively small areas with communities of long-lived fauna (e.g., the foliose bryozoan *Pentapora foliacea*). Physical loss of habitat is an extreme pressure on marine ecosystem. Habitat is lost if its substrate, morphology or topography is permanently altered. The main activities causing such damage are offshore installations, port anchorage, dredging and dumping, windfarms, sand or gravel extractions and all kinds of constructions in or over the seabed.

Physical disturbance is caused by several human activities that affect the seabed either directly or indirectly. The main drivers are demersal fishing, shipping in shallow waters, finfish aquaculture, port anchorage, dredging and offshore installations. Sedimentation caused by dredging operations, demersal fishing gears, sediment disposal and construction projects spread sediments to the water column and cause direct sedimentation disturbance, which attenuates away from the activity zone. Abrasion of the seabed by benthic trawling or mussel and scallop dredging damages abiotic and biotic structures, whereas indirect abrasion is caused around built structures by altered current regimes or in shallow waters by wake induced turbulence from ships.

## **Destructive Fishing Practices**

Highly destructive fishing methods, using explosives or poison (cyanide), are widely practiced on the coral reefs of southeast Asia. About one third of the world's coral reefs is situated in southeast Asia, covering nearly 100,000 km<sup>2</sup>. It is estimated that 56% of these reefs are threatened by destructive fishing methods. Poison (sodium cyanide) is used to stun fish (especially high-value aquarium fishes), making them easier to catch. The poison attacks the corals that die from repeated exposure; other organisms of the coral ecosystem suffer the same fate.

## **Use of Explosives**

The use of explosives like potassium nitrate not only kills the fish swimming around, but also severely damages the coral. Regularly bombed reefs exhibit 50–80 percent coral mortality. Fish that are not captured float to the surface or sink to the bottom. The fishermen themselves risk their lives or lose limbs from prematurely exploding bombs.

While these destructive fishing methods are banned in most countries, enforcement is a major problem. The precariousness of the coastal population and lack of education are important drivers. The yields from these fishing methods are more than ten times the costs of poison and explosives. Due to the illegality of these practices, the extent of exploitation is not well known. RP-85 exploding-bridge wire detonators (explosive material used was equivalent to 1778 mg of TNT) at different standoff distances were used to generate varying initial shock wave strengths. Results showed that implosion could be initiated at lower static pressure when the structure is subjected to a nearby explosive loading as compared with hydro statically induced cases.

Additionally, higher strength explosive loading excited higher-order initial vibration which then induced the structural collapse. Later, a more detailed study was conducted in an attempt to investigate the shock initiated structural instabilities of underwater cylindrical structures using aluminum specimens. A relationship between hydrostatic pressure, structural stiffness, and vibration frequency was established to evaluate the structural integrity of submerged cylinders under dynamic loading.

## **Effects of Ghost-Fishing**

Even though when nets or catch-pots are lost, they may continue to fish. This phenomenon is known as ‘ghost-fishing’. Ghost fishing gear comprises abandoned, lost, and discarded fishing gear, often designated by the acronym Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG). Richardson et al. (2019) estimate that 5.7% of all fishing nets, 8.6% of all traps, and 29% of all lines are lost around the world each year. In circumstances where nets or pots are snagged onto rocks, holding the net in place, or lost in relatively stable deep-water environments, they may continue to fish indefinitely. In these cases, a typical pattern of capture is observed. Over the first few days, catches decline almost exponentially as the increasing weight of catch causes the net to collapse. Then, for the next few weeks, the decaying bodies of fishes and Crustacea attract large number of scavenging crustaceans, many of which are valuable commercial species and also become entangled in the

net. Thereafter, there appears to be a continuous cycle of capture, decay and attraction for as long as the net has some entanglement properties.

A literature review of the effects of ghost fishing estimated the total average catch of ALDFG at 10-100 individuals per meter of ghost net, with in some cases maxima of tens of thousands of individuals (fish or crustaceans). Ghost traps/pot catches decline sharply within a few years, but ghost net catches persist for periods of 5 years or more, reaching a maximum around 3 years. Biodegradable gillnets have been developed with a shorter lifespan in the marine environment than conventional nylon nets. These nets shorten ghost fishing time by several years, which may outweigh the disadvantage of reduced catch efficiency over time. Financial support to fishermen may be necessary to compensate for declining income from the use of biodegradable fishing gear.

### **Trophic Cascading Effect**

Changes in one level of a food web can also have cascading effects on others. For example, in the Black Sea, a trophic cascade was triggered by fishery removals of apex predators (bonito *Sarda sarda*, mackerel *Scomber scombrus*, bluefish *Pomatomus saltatrix*, dolphins), which caused a decreased consumer control and led to higher abundance of planktivorous fish (i.e., Black Sea sprat *Clupeonella cultriventris*, anchovy *Engraulis encrasicolus*, horse mackerel *Trachurus mediterraneus ponticus*). The increased consumption by planktivorous fish caused a decline in zooplankton biomass that in turn allowed phytoplankton to increase. This chain of events is thought to explain the explosions of phytoplankton and jellyfish reported in the Black Sea over the past 30 years. In marine ecosystems, fishing often targets predators, which can drive direct and indirect effects on entire food webs. Marine reserves can induce trophic cascades by increasing predator density and body size, thereby increasing predation pressure on populations of herbivores, such as sea urchins.

### **Food-Web Competition**

Food-web competition: top predators (such as marine mammals) and fisheries may not directly compete (because they consume different species) but could be indirectly affected by fisheries, because of limits on the primary productivity available to support the two groups. An apex predator may be affected by fisheries even when the prey and species caught do not overlap. This has been termed 'food-web competition'. Food-web competition occurs when there is potential overlap of the trophic flows supporting a given group (e.g., Marine mammals)

with the trophic flows supporting another group (e.g., fisheries). The relationship between the size of fishery catches and the amounts of primary production required to sustain fisheries and marine mammals suggests that the primary production available to marine mammals may decline as catches increase.

## **Overfishing**

In the ocean, the over-exploitation of fish, shellfish and other organisms (targeted and non-targeted species) has the largest relative impact on biodiversity. Over the last 50 years, fishing has expanded at all scales: fishing boats are bigger, they go further, deeper, for a longer time, with increasing technical gear. As a result, the number of overexploited fish populations has been expanding too. However, we are not fishing more fish (in terms of tonnage) since 1996, when we've reached a peak of productivity. But to try to maintain this number we are continuing to exploit marine populations at an unsustainable rate – a rate at which, populations cannot regenerate fast enough to replenish and ensure the durability of the “stock”. The amount of bycaught species (accidentally caught) is also tremendous, with a global estimate of 40% of total marine catches being “unwanted” species, often released dead in the water or illegally old-world. With this, it seems obvious that the unsustainable exploitation of marine organisms is directly causing the biggest impact on life in the ocean.

The magnitude of the problem, however, is often overlooked, given the competing claims of deforestation, desertification, energy resource exploitation and other biodiversity depletion dilemmas. In part, there is often little focus on the rapid growth of demand for fish and fish products, both domestically and in export markets, leading to fish prices increasing faster than prices of meat. As a result, fisheries investments have become more attractive to both entrepreneurs and governments, much to the detriment of small-scale fishing and fishing communities all over the world. In the last decade, in the north Atlantic region, commercial fish populations of cod, hake, haddock and flounder have fallen by as much as 95%, prompting calls for urgent measures. Some are even recommending zero catches to allow for regeneration of stocks, much to the ire of the fishing industry.

According to a Food and Agriculture Organization (FAO) estimate, over 70% of the world's fish species are either fully exploited or depleted. The dramatic increase of destructive fishing techniques worldwide destroys marine mammals and entire ecosystems. FAO reports that illegal, unreported and unregulated fishing worldwide appears to be increasing as fishermen seek to avoid stricter rules in many places in response to shrinking

catches and declining fish stocks. Few, if any, developing countries and only a limited number of developed ones are on track to put into effect by this year the International Plan of Action to Prevent, Deter and Eliminate Unreported and Unregulated Fishing. Despite that fact that each region has its Regional Sea Convention, and some 108 governments and the European Commission have adopted the UNEP Global Programme of Action for the Protection of the Marine Environment from Land based Activities, oceans are cleared at twice the rate of forests.

The Johannesburg forum stressed the importance of restoring depleted fisheries and acknowledged that sustainable fishing requires partnerships by and between governments, fishermen, communities and industry. It urged countries to ratify the Convention on the Law of the Sea and other instruments that promote maritime safety and protect the environment from marine pollution and environmental damage by ships. Only a multilateral approach can counterbalance the rate of depletion of the world's fisheries which has increased more than four times in the past 40 years.

### **Effects on Phenotypic Evolution**

Large changes in size-at-age and age-at-maturation of commercially exploited fish have been reported in a number of ecosystems. Survival and reproduction are functions of body size. Small fish generally incur higher mortality rates and produce fewer eggs than larger fish. Gear is designed to remove some kinds of individuals in preference to others, usually individuals that are larger and, indirectly, older. The location of fishing is often non-random relative to spatial distributions of stocks, being concentrated where the harvestable biomass is greatest or where fishes are most accessible, or both. Fishing mortality is therefore selective with respect both to species and to phenotypic variation within species. Moreover, even a uniform change in overall mortality is evolutionarily selective. This happens because mortality discounts fitness gains incurred in late life; traits such as maturation that involve trade-offs between fitness gains in early and late life are therefore affected by a change in mortality, selective or not.

There are strong indications that the observed changes have partly a genetic basis. However, it is difficult to distinguish genetic evolution from phenotypic plasticity, i.e., a tendency of phenotypic traits to take different values depending on the current environmental conditions. Rijnsdorp (1993) carried out a study to disentangle the causes of a major phenotypic change in maturation of North Sea plaice (*Pleuronectes platessa*). He concluded that a substantial part of the change in maturation is consistent with genetic change caused by fishing.

Simply through the action of fishing, fisheries generate a selection, causing evolution in life-history traits. More recently, similar results have been obtained for many different fish populations, although the extent to which the documented changes are genetic versus environmental remains debated.

The common trend is a decreased age-at-maturation in heavily exploited fish stocks, but this selection pattern is not always consistent. For instance, there are two spatially separated fisheries targeting cod (*Gadus morhua*) in the Barents Sea: a feeder (exploitation of the stock on the feeding grounds) and a spawner fishery (exploitation of the stock on the spawning grounds). Fishing confined to the spawning grounds gives an advantage to late maturation. This is because the extra mortality due to fishing on the spawning grounds makes it advantageous to grow for longer before maturation and thereby to produce more eggs when risking a visit to the spawning ground. If fishing mortality on the feeding grounds is added on, the relatively small advantage to late maturation is changed to a large advantage to early maturation. Remaining on the feeding grounds is now itself risky, and a fish that does not mature until about, say 8 years of age is most likely to be caught before it spawns. Current patterns of fishing generate strong selection for early maturation and, given appropriate genetic variation, substantial genetic change can be expected. But, if one were to try to reverse the process by closing the fishery, selection for later maturation would be weak. In other words, it could be hard to undo the effects of inadvertent selection caused by fishing.

### **Effects of Marine Pollution:**

- a. Apart from causing Eutrophication, a large number of organic wastes can also result in the development of 'red tides. These are phytoplankton blooms because of which the whole area is discolored.
- b. Commercially important marine species are also killed due to the clogging of gills and other structures.
- c. When oil is spilled on the sea, it spreads over the surface of the water to form a thin film called as oil slick. This damages marine life to a large extent. Commercial damage to fish by tainting which gives an unpleasant flavor to fish and sea food reduces market values of sea food and causes death of birds through its effect on feathers. Birds often clean their plumage by preening and in the process consume oil which can lead to intestinal, renal and liver failure.
- d. For salt marshy plants oil slick can affect the flowering, fruiting and germination.

- e. Organic waste addition results in end products such as hydrogen sulphide, ammonia and methane which are toxic to many organisms. This process results in the formation of an anoxic zone which is low in its oxygen content; from which most life disappears except for anaerobic microorganisms and renders the water foul smelling.
- f. The coral reefs are the productive ecosystems offer many benefits to people. These coral reefs are threatened by (a) the sediments from deforestation carried by the runoffs, (b) the agricultural and industrial chemicals reaching through river discharges. To mention an example. River Ganga is estimated to carry 1.5 billion tons of sediments due to deforestation and intensive farming in India, Bangladesh and Nepal through which it flows to Bay of Bengal.
- g. Drill cuttings dumped on the seabed result in the production of toxic sulfides in the bottom sediment thus eliminating the benthic fauna.
- h. Pollution due to oil: Crude oil is transported by sea after a tanker has unloaded its cargo of oil; it has to take on sea water ballast for return journey. This ballast water is stored in cargo compartments that previously contained oil.

During the unloading of cargo certain amount of oil remains clinging to the walls of container and this may amount to 800t in a 200,000t tankers. The ballast water is thus contaminated with oil. When fresh cargo of oil is to be loaded these compartments are cleaned with water which discharges the dirty ballast along with oil into the sea.

## **Conclusion**

Fishing, often in conjunction with environmental change, has reduced the abundance of many fish populations and driven others to economic extinction. Local populations of site-attached species, which are particularly accessible to fishers, may be extirpated by fishing. Many fishing techniques have direct effects on marine habitats and benthic fauna, but these effects occur against a background of natural disturbance and, as a result, the significance of fishing effects increases tremendously.

Fisheries science has a rich history of research contributions to population dynamics and evaluation of marine ecosystems, and a great deal of the long-term data used to evaluate natural variation is based on fisheries. Recently, the ability of fisheries to be managed in a sustainable manner has been questioned (Ludwig et al., 1993), due in large part to the complexity of the ecological and social/cultural systems involved. Others have argued that positive examples

from the past, learning from past errors, and new understanding of resource fluctuations make sustainable use an attainable objective (Rosenberg et al., 1993).

Biodiversity is a critical element in ecosystem function, and thus in maintaining sustainable populations. Therefore, biodiversity is an important issue to fisheries and should be of concern to fishery managers. Many of the effects of marine fisheries on biodiversity are distinct and obvious, but evidence is circumstantial or lacking for some of the potentially most devastating effects. On the time scale of decades, however, fisheries can change genetic, species, and ecosystem diversity from levels that have been achieved over millions of years through natural selection.

There is little doubt that such changes in biodiversity will decrease the resiliency of species, communities, and ecosystems to respond to natural perturbations that occur on longer time scales, it is thus critical to understand the alterations that fisheries and other anthropogenic changes have wrought on marine biodiversity and to develop strategies that will ameliorate future ecological changes. The requisite research will go beyond simple inventories (Renner and Ricklefs, 1994) and will require process-oriented studies at the regional level (NRC, 1995). Fisheries have major impacts on marine biodiversity; long-term sustainability of these fisheries may be dependent on the very diversity that they are changing.

## Reference

1. [www.coastalwiki.org](http://www.coastalwiki.org)
2. [www.fao.org](http://www.fao.org)
3. [www.reserachgate.net](http://www.reserachgate.net)
4. [www.msc.org.oceans-at-risk](http://www.msc.org.oceans-at-risk)
5. [www.fao.org.background](http://www.fao.org.background)
6. *Biodiversity and the sustainability of Marine fisheries* by GW Boehlert

## CHAPTER VI

### DATA COLLECTION AND ANALYSIS

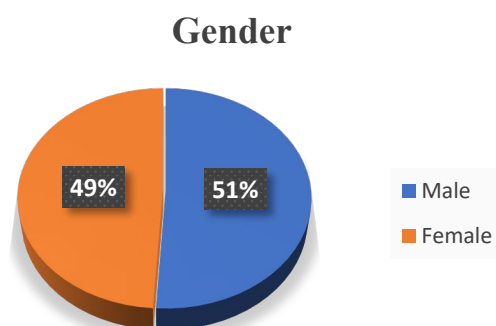
As part of the project, a comprehensive study was conducted in the coastal regions surrounding Vaddy Harbour. The primary objective was to gather insights from the residents of Vaddy. For this, we collected data from a sample size of approximately 100 individuals. Among these participants, 51 were identified as male, while 49 were identified as female, ensuring a balanced representation of gender within our study.

The survey also encompassed various facets of the participants' lives, including their education levels, income stability, economic standing, and medical conditions. By exploring all these different aspects of people's lives, we aimed to create a general picture of the community living near Vaddy Harbour.

These pie charts provide a visual representation of the data we collected, making it easier to grasp the key findings of our study.

**Table 6.1: Gender Distribution**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
Male	51	51%
Female	49	49%
Others	0	0
Total	100	100%

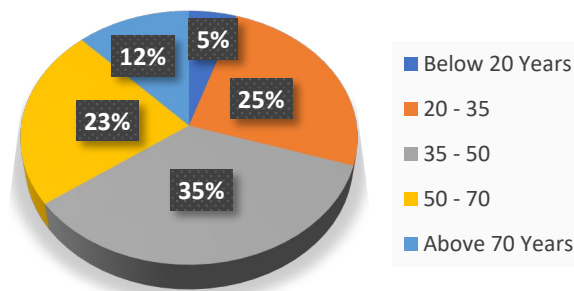


The analysis reveals that 51% of respondents identified as male, while the remaining 49% identified as female.

**Table 6.2: Age Distribution**

Age	Frequency	Percentage
Below 20 Years	5	5%
20 - 35	25	25%
35 - 50	35	35%
50 - 70	23	23%
Above 70 Years	12	12%
Total	100	100%

**Age Group**

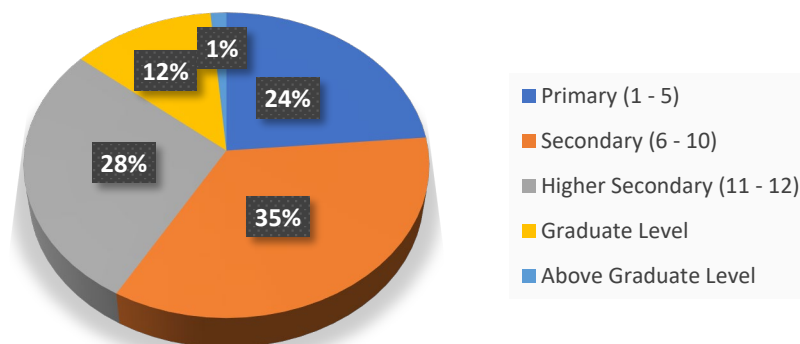


Findings indicate that respondents were distributed across various age groups as follows: below 20 years (5%), 20-25 years (25%), 35-50 years (25%), 50-70 years (23%), and above 70 years (12%).

**Table 6.3: Education Level**

Level	Frequency	Percentage
Primary (1 - 5)	17	24%
Secondary (6 - 10)	25	35%
Higher Secondary (11 - 12)	20	28%
Graduate Level	9	12%
Above Graduate Level	1	1%
Total	72	100%

**Education Level**

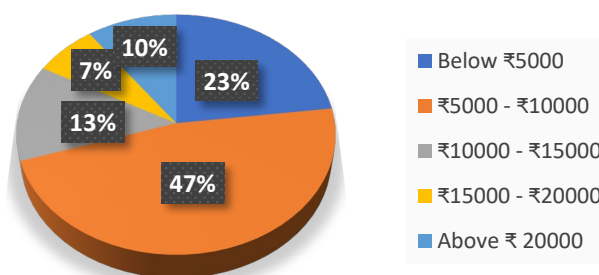


The data shows a distribution of education levels, with primary education (grades 1-5) representing 24% of respondents, secondary education (grades 6-10) at 35%, higher secondary education (grades 11-12) at 28%, graduate-level education at 12%, and above graduate-level education at 1%.

**Table 6.4: Average Monthly Income**

Income	Frequency	Percentage
Below ₹5000	9	23%
₹5000 - ₹10000	19	47%
₹10000 - ₹15000	5	13%
₹15000 - ₹20000	3	7%
Above ₹ 20000	4	10%
Total	40	100%

### Average Monthly Income

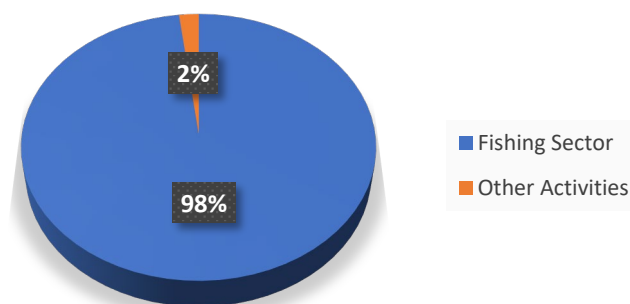


Income distribution among families is delineated as follows: Below 5000 (23%), 5000-10,000 (47%), 10,000-15,000 (13%), 15,000-20,000 (7%), and Above 20,000 (10%).

**Table 6.5: Men's Occupational Patterns**

Men's Occupation	Frequency	Percentage
Fishing Sector	50	98%
Other Activities	1	2%
Total	51	100%

### Men's Occupation

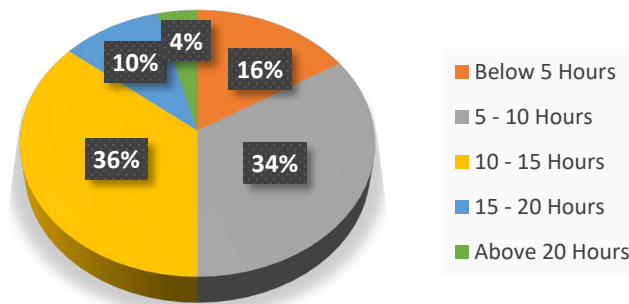


The majority (98%) of male respondents were employed in the fishing sector, with a mere 2% engaged in other activities.

**Table 6.6: Working Hours of Fishermen**

Working Hours	Frequency	Percentage
Below 5 Hours	8	16%
5 - 10	17	34%
10 - 15	18	36%
15 - 20	5	10%
Above 20 Hours	2	4%
Total	50	100%

**Working Hours of Fishermen**

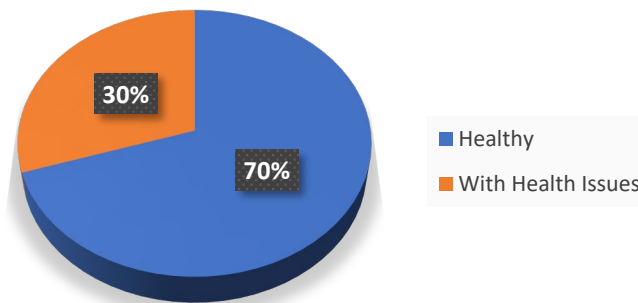


Data reveals the daily working hours of fishermen as follows: below 5 hours (15%), 5 to 10 hours (35%), 10 to 15 hours (36%), 15 to 20 hours (10%), and above 20 hours (4%).

**Table 6.7: Health Status**

Health Status	Frequency	Percentage
Healthy	70	70%
With Health Issues	30	30%
Total	100	100%

**Health Status of Families**

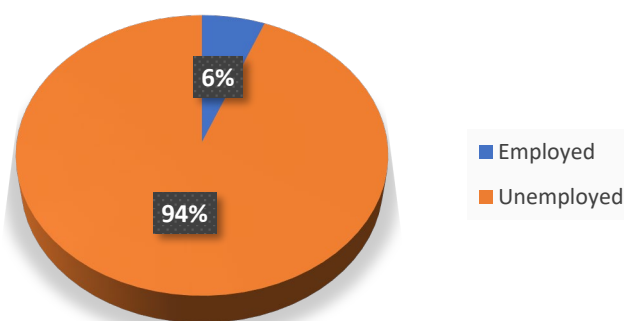


Analysis portrays that 70% of respondents reported good health, while 30% faced health issues such as cardiac problems and allergies.

**Table 6.8: Women's Employment Status**

Employment Status	Frequency	Percentage
Employed	3	6%
Unemployed	46	94%
Total	49	100%

### Women's Employment

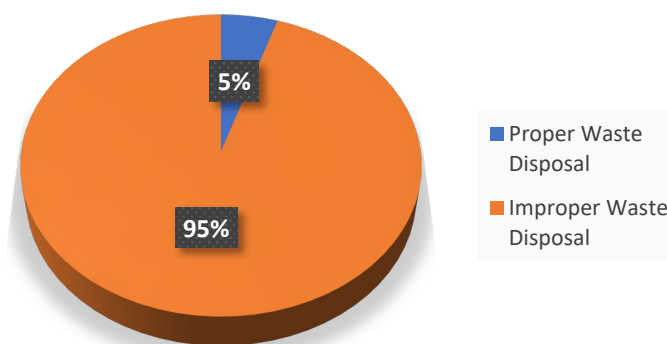


A significant portion of women (94%) were found to be unemployed, contrasting with the minority (6%) who were employed.

**Table 6.9: Waste Disposal Practices**

Waste Disposal Manner	Frequency	Percentage
Proper Waste Disposal	2	5%
Improper Waste Disposal	38	95%
Total	40	100%

### Waste Disposal Habits of Families



The data illustrates waste disposal habits among families, with 5% adhering to proper disposal methods and the remaining 95% resorting to improper disposal practices.

## CHAPTER - VII

### CONCLUSION

#### Introduction

A case study on the socio-economic impact of coastal instability and biodiversity of Vaddy harbour in Kollam district shows that about the major problems of coastal communities such as high poverty, low level of health infrastructures, low level of education etc. It is found from the study that more than 94% of women in the Vaddy was unemployed and more than 95% of household wastes are improperly disposed. About 87% of people don't go for further studies after higher secondary. Average income level is very low hence most of them living in absolute poverty.

#### Findings of the study

Based on analysis and interpretation of data collected through questionnaire, the major findings are:

1. Looking at the general characteristics of the people considered for the study, it was found that the majority of the respondents were male than female. The analysis reveals that 51% of respondents identified as male, while the remaining 49% identified as female.
2. Looking at the age characteristics of the respondents it can be seen that 35% of the people belong to the age group of 35-50, while the remaining 25% of respondents belong to the age group of 20-35 and 23% of respondents belong to the age group of 50-70, 5% is below 20 years and 12% is above 70 years. Thus, the increase in the elderly population is quite a challenge, they require more health care services and assistance with daily activities.
3. Considering the educational details of people, it can be seen that 24% has completed their primary education (grades 1-5), 35% has done their secondary education (grades 6-10), 28% has completed their higher secondary and 12% has completed their graduation,

only 1% has studied above graduation level. The limited access to quality education is one of the major reason for lack of education.

4. Analysing the occupational patterns of men 98% of male were employed in fishing sector with a mere 2% engaged in other activities such as wage work. Thus, their major source of income is fishing. Economic characteristics of the respondents reveal that majority were economically weaker with them falling on the below poverty line category.
5. 47% of the family receives an average monthly income of 5000- 10000. Only 10% of people receive above 20000. The daily income may vary according to various reasons. Factors like weather conditions, availability of fish, market techniques etc. can all impact their earnings.
6. The data reveals that the daily working hours of fisherman may also vary according to several reasons such as tides, weather conditions and fishing regulations. 36% of men work for 10-15 hours a day and about 20%work for above 20 hours daily.
7. 94% of women face lack of employment opportunities even if they are qualified. The analysis shows that there existed gender inequality and cultural norms in the coastal areas of Vaddy.
8. Considering the health status of respondents 70% of respondents reported good health at the same time 30%face health issues such as cardiac problems and allergies.
9. Another important challenge includes waste management, the analysis reveals that only 5% of families follow proper disposal methods and the remaining 95%resorting to improper disposal practises. A practise of dumbing waste to sea is a common in coastal areas which may have significant negative impact on the marine ecosystem and the overall health of coastal areas.

### **Validation of objectives**

1. To identify the socio-economic conditions of the people of the coastal areas of Vaddy.
2. To analyse the gender inequality that exists in the coastal areas in respect to the total population.

3. To examine the healthcare facilities and the quality of education in the remote coastal areas of Vaddy.
4. To identify policies to overcome the socio-economic problems of residents of coastal areas.
5. To identify the effects of fisheries on marine biodiversity.
6. To study the impact of coastal erosion on the diversity of marine species.

The above stated objectives are validated through a comprehensive research design and extensive data collection and analysis. The residents of Vaddy face socio economic problems in the case of health, education and gender inequality.

### **Validation of hypotheses**

The main objectives of this project are to explore the socio-economic conditions, the inequality, the health care and education, and the policies for coastal areas development. The hypothesis proposed for “Socio-economic problems faced by residents of coastal areas of Vaddy” are as follows:

1. The socio-economic conditions of the people of the coastal areas of Vaddy are significantly different from those of the inland areas and are influenced by factors such as climate change, environmental degradation, marine plastic pollution, etc. The above statement is valid because many residents of Vaddy suffer from allergies and related health issues due to climate change. Due to the same reason, there will be obstructions in their means of livelihood, marine plastic pollution affects the overall health of coastal areas.
2. Livelihood challenges, due to overfishing, pollution, and changes in marine ecosystems, negatively influence the socio-economic fabric of coastal communities. The former statement is valid. Due to overfishing there will be a decline in the growth rate of the marine population, disrupting the food chain and harming biodiversity. Along with that, the pollution affects the marine ecosystem.
3. Social inequality significantly influences access to education, healthcare, and employment opportunities in coastal regions. The above stated hypothesis is null. Because it is not the social inequality that denies the access of education, health care,

employment and so on, on the other hand it is the socio-economic background that influences the former.

4. The coastal residents of Vaddy have low awareness and participation in the existing policies and programs that aim to address the coastal issues and improve their livelihoods. The prior statement is valid as they are less aware about the existing policies and rights due to illiteracy.

## **Summary**

Research Design is the main part of the project. It contains the main areas of study.

The research design would involve collecting data on various aspects such as marine species diversity, coastal erosion and socio-economic factors. This data would be gathered through surveys, field observations, and analysis of existing data sources. The chapter includes a statement of problem, scope of study, objective of the study, importance of the study, Methodology, Review of literature, plan of work. The research design would aim to provide a comprehensive understanding of the coastal area and guide future conservation and management efforts.

Based on the second chapter Human rights are a set of universal rights and freedoms that are inherent to all individuals, regardless of their nationality, race, gender, or any other characteristic. They are based on the belief that every person deserves to be treated with dignity, equality, and respect. Human rights are often categorized into civil and political rights, such as the right to life, liberty, and freedom of expression, and economic, social, and cultural rights, such as the right to education, healthcare, and work. These rights are protected by international laws and treaties, and their implementation is crucial for promoting justice, equality, and the well-being of individuals and communities.

Historical background includes the history of the Vaddy harbour and about the background of the coastal communities in Vaddy. Vaddy Kollam is a prominent coastal area in Kerala, India. Its history is intertwined with various renowned Kerala dynasties. Therefore, Vaddy Kollam holds significant importance in the historical narrative of Kerala. It includes the socio-economic impact of coastal instability in Vaddy. It mainly pointed out the lack of education and high levels of poverty. Vaddy Kollam has experienced socio-economic instability in the past. Factors such as changing economic trends, population growth, and

environmental challenges have contributed to this instability. It is important to study and understand these issues to develop strategies for sustainable development and improve the socio-economic conditions in Vaddy Kollam.

It includes the effects of fisheries in marine biodiversity. It concludes that the fisheries directly or indirectly affect the marine. The effects of fisheries on marine biodiversity can be significant. Overfishing and destructive fishing practices can lead to the decline of certain fish species, disrupt food chains, and harm the overall health of marine ecosystems. Studying these effects helps us understand the importance of sustainable fishing practices and the need to protect marine biodiversity for the long-term health of our oceans. Biodiversity which results in many issues related to marine fishes living.

Based on the data analysis and collection of the coastal area of Vaddy Kollam, we can draw important conclusions. This information allows us to better understand the socio-economic factors, environmental challenges, and potential solutions for sustainable development in Vaddy Kollam. By studying and analysing this data, we can make informed decisions to protect the coastal area's biodiversity and promote its long-term well-being. It also includes about the detailed analysis of data which gathered from the sample survey about the communities in Vaddy harbour. The analysis helps in the identification of many data such as the level of poverty, the level of health, the level of education etc.

### **Suggestions for further study**

There are many favourable circumstances for the sustainable coastal development practices, the impact of climate change on coastal areas, or even the economic benefits of coastal tourism.

- There should be implementation of proper awareness regarding the importance of education.
- Poverty alleviation programs should be implemented by the authority.
- Programs should be implemented for the upliftment of the women in terms of education and employment.
- Authorities should give more attention to the hygiene of coastal areas.
- Government should take initiatives by providing proper awareness to the residents regarding the disposal of food waste.

- Some examples of sustainable coastal development practices include implementing green infrastructure, such as coastal wetland restoration or the creation of artificial reefs. Other practices include promoting responsible tourism, managing coastal erosion through beach nourishment, and implementing strict regulations to protect marine ecosystems. These practices help to maintain the balance between development and environmental conservation.
- Additionally, the installation of green roofs can help manage storm water runoff and reduce pollution in coastal areas.
- When it comes to responsible tourism in coastal areas, great advice is promoting sustainable fishing practices. This includes educating both locals and tourists about the importance of respecting fishing regulations, avoiding overfishing, and supporting local fishermen who use sustainable methods. By doing so, we can help preserve the delicate balance of marine ecosystems and ensure the long-term viability of coastal communities.

### **Limitations of the study**

- Since the study only included random people in Vaddy Harbour, there's a chance that the data collected might not be entirely accurate and could have some errors.
- Findings from a specific context like Vaddy may not be directly applicable to other regions.
- Limited time.
- The availability of literature regarding the research study was limited.
- Lack of people participation.
- Lack of resources.

## BIBLIOGRAPHY

### Primary sources

Field visit: Based on the fieldwork conducted on the coastal areas of Vaddy in Kollam, we concluded that the residents of Vaddy are socially and economically weaker in fields of education, employment livelihood, and so on when compared to the coastal inlands. And also, understood the challenges and difficulties faced by the local fishermen in making a living.

### Secondary sources

#### a) Books

1. Gulati, L. (1983). *Women in fishing villages on the Kerala coast: Demographic and socio-economic impacts of a fisheries development project.*
2. Jayappa, K. S., & Narayana, A. C. (2013). *Coastal environments: Problems and perspectives.* IK International Pvt Ltd.
3. Kumar, A. (2008). *Environmental science and technology in India.* Daya Books.
4. Kurien, J. (2000). *Factoring Social and Cultural Dimensions into Food and Livelihood security Issues of Marine Fisheries: A case Study of Kerala State, India.*
5. Kurup, B. M. (2009). *Coastal and marine fisheries resources of Kerala—conservation and sustainable development.* Coastal Environments Problems and Perspectives, 19-38.
6. Ramachandran, B. B. (2021). *An Anthropological Study of Marine Fishermen in Kerala: Anxieties, Compromises and Survivals.* Cambridge Scholars Publishing.

#### a) Journals

1. Devi, S., Arunachalam, P., & AP, S. P. (2018). *Vulnerability assessment of fishing communities in Kerala, towards the impact of climate change—with special reference to Cherai.* Sriwijaya International Journal of Dynamic Economics and Business, 177-192.

2. Divakarannair, N. (2007). *Livelihood assets and survival strategies in coastal communities in Kerala, India* (Doctoral dissertation).
3. Geevan, C. P. (1999). *KERALA'S COASTAL AREA. Rethinking Development: Kerala's Development Experience*, 2, 279.
4. Salim, S. S., Narayanakumar, R., Remya, R., Safeena, P. K., & Ramees, R. M. (2019). *Climate change impacts on livelihood vulnerability assessment: adaptation and mitigation options in marine hot spots in Kerala, India*. *COMING SOON*, 53.
5. Sarun, S., Ghermandi, A., Sheela, A. M., Justus, J., & Vineetha, P. (2018). *Climate change vulnerability in a tropical region based on environmental and socio-economic factors*. *Environmental monitoring and assessment*, 190, 1-17.
6. Shyam, S. S., Kripa, V., Zacharia, P. U., Mohan, A., & Ambrose, T. V. (2014). *Vulnerability assessment of coastal fisher households in Kerala: A climate change perspective*. *Indian Journal of Fisheries*, 61(4), 99-104.
7. Subramanian, A., Nagarajan, A. M., Vinod, S., Chakraborty, S., Sivagami, K., Theodore, T., ... & Mangesh, V. L. (2023). *Long-term impacts of climate change on coastal and transitional eco-systems in India: an overview of its current status, future projections, solutions, and policies*. *RSC advances*, 13(18), 12204-12228.

### **c) Periodicals**

1. *Coastal Living*
2. *Coastal Management*
3. *Economic and political weekly*
4. *Estuaries and Coasts*
5. *Front line*
6. *Marine Policy*
7. *National Geographic*
8. *Oceanography*
9. *The week*

**d) Newspapers**

1. *The Hindu*
2. *The Indian Express*
3. *The Kerala Kaumudi*
4. *The Mathrubhumi*
5. *The Malayala Manorama*
6. *The Times of India*

**d) Websites**

1. [www.coastallife.net.au](http://www.coastallife.net.au)
2. [www.keralatourism.org](http://www.keralatourism.org)
3. [www.thegef.org](http://www.thegef.org)
4. [www.proquest.com](http://www.proquest.com)
5. [www.britannica.com](http://www.britannica.com)
6. [www.researchgate.net](http://www.researchgate.net)
7. [www.wikipedia.com](http://www.wikipedia.com)
8. [www.coastalwiki.org](http://www.coastalwiki.org)
9. [www.fao.org](http://www.fao.org)
10. [www.researchgate.net](http://www.researchgate.net)
11. [www.msc.org.oceans-at-risk](http://www.msc.org.oceans-at-risk)
12. [www.fao.org.background](http://www.fao.org.background)

## APPENDIX I

### Questionnaire

1. Name -
2. Age -
3. Gender - Male/Female/others
4. Category -
5. Religion - Hindu / Christian / Muslim / others
6. Color of ration card -
7. Average monthly income -
8. Educational level -
9. No of family members -
10. Occupation -
11. Daily working hours -
12. Sanitation quality -
13. Affected by seasonal variation -
14. Accessibility of safe drinking water -
15. Type of house -
16. How easy or difficult is it for you to access quality healthcare service?
  - i. Very easy
  - ii. Easy
  - iii. Hard
  - iv. Very hard

17. In what ways has the coastal environment changed in the past 10 years? (Can select more than one option)

- i. Sea level rise
- ii. Coastal erosion
- iii. Salt water intrusion
- iv. Loss of biodiversity
- v. Increased pollution
- vi. Others (specify)

18. How do these changes affect your livelihood and wellbeing?

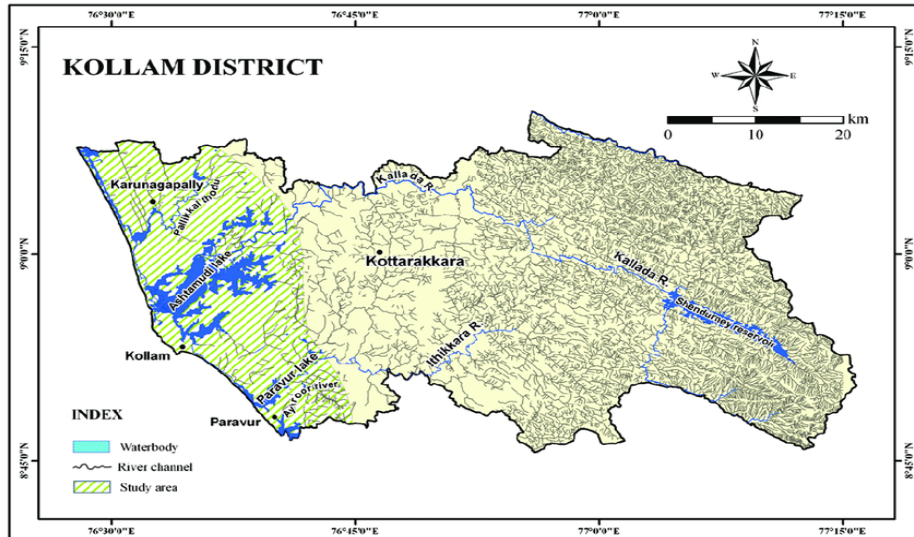
- i. Reduced fish catch
- ii. Damaged crops
- iii. Increased health risks
- iv. Loss of property
- v. Reduced income
- vi. Others

19. What are the main health problems that you or your family face?

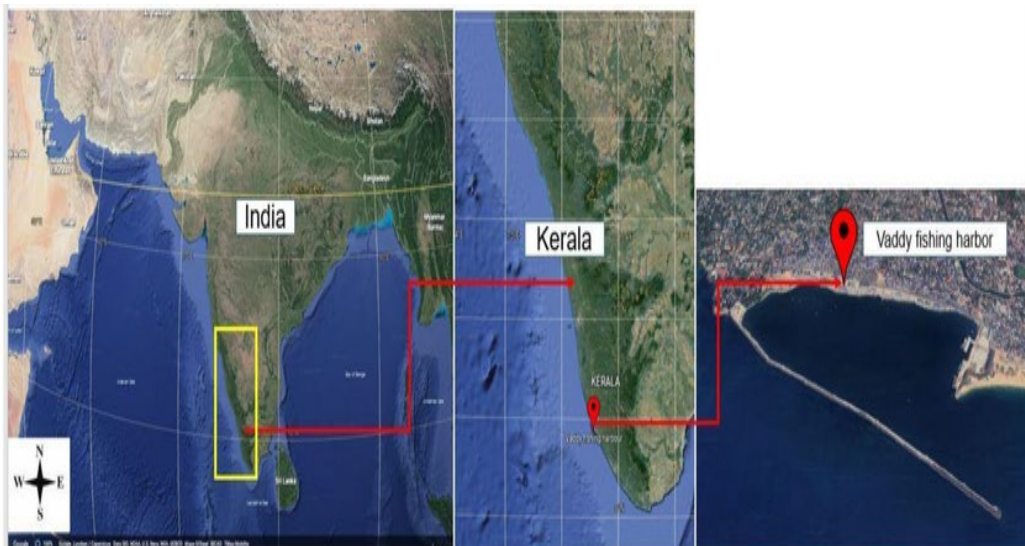
20. How do you usually dispose of your food waste?

## APPENDIX II

Source 2.1: Drainage map of Kollam district showing the coastal areas

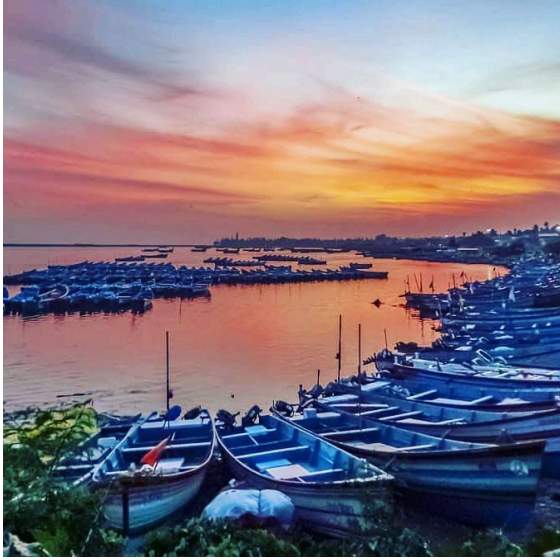


Source 2.2 : Map showing the vaddy harbour



## APPENDIX III

Source 3.1: Coastal areas of Vaddy



**Source 3.2: Vaddy Harbor**



**Source 3.3: Roadways of Vaddy**



**Source 3.4: Field work at houses of Vaddy**



## **Reference**

1. [www.images.app.goo.gl/Dp86VYwYgLXKFm2L9](http://www.images.app.goo.gl/Dp86VYwYgLXKFm2L9)
2. [www.images.app.goo.gl/gjnWNUk7qVJ8P2bp7](http://www.images.app.goo.gl/gjnWNUk7qVJ8P2bp7)
3. [www.images.app.goo.gl/hWoi3Sv19SzpwEY58](http://www.images.app.goo.gl/hWoi3Sv19SzpwEY58)
4. [www.images.app.goo.gl/FHChPYKwLsdM4i4a8](http://www.images.app.goo.gl/FHChPYKwLsdM4i4a8)
5. [www.images.app.goo.gl/2ZZ2ANUEcXC8WNAX8](http://www.images.app.goo.gl/2ZZ2ANUEcXC8WNAX8)
6. [www.https://images.app.goo.gl/tvcKRfxhZqgWtiHW7](http://www.https://images.app.goo.gl/tvcKRfxhZqgWtiHW7)
7. [www.images.app.goo.gl/skLgsJK8VniCRMsx8](http://www.images.app.goo.gl/skLgsJK8VniCRMsx8)

\*\*\*\*\*