

Report of the Janakeeya Padana Samithi

OUR BEACHES, OUR SEA:
HERITAGE OF FISHING COMMUNITIES,
USUFRUCT OF ALL CITIZENS



Impact of the
Vizhinjam International Seaport
on the Beaches, Coastal Sea, Biodiversity, and the Livelihoods
of Fishing Communities in Thiruvananthapuram District

November 2023

Prepared for the Janakeeya Samara Samithi

Our Beaches, Our Sea

“Our Beaches, Our Sea,” a tale to unfold,
A heritage of fishing, a story of old,
Communities intertwined with the tide,
In the embrace of the sea, they've thrived.

Usufruct of citizens, a shared embrace,
A treasure of waves, an open space,
From fishermen's lore to families' play,
These shores unite us in a special way.

Generations past, their livelihoods cast,
Nets and tales woven, memories amassed,
With every sunrise and each ebbing wave,
A legacy cherished, a heritage brave.

From sandy shores to horizon's gleam,
A bond with the sea, a timeless dream,
Together we stand, hand in hand,
Preserving the beauty of our coastal land.

"Our Beaches, Our Sea," a heritage true,
For fishing communities and citizens too,
In unity we thrive, in nature's grand dance,
Honoring the past, with a future's chance.

A Passionate Supporter

There is a need to bring science of coastal dynamics into coastal protection and to deal with the entire coast affected or likely to be affected by any intervention.

**A broad conclusion of these Guidelines is that
“the beach is the best form of coastal protection”**

**Reference Manual on Climate Change Adaptation Guidelines for
Coastal Protection and Management in India.
March 2019**

“Both everyday experience and scientific research show that the gravest effects of all attacks on the environment are suffered by the poorest. For example, the depletion of fishing reserves especially hurts small fishing communities without the means to replace those resources and rises in the sea level mainly affect impoverished coastal populations who have nowhere else to go

It needs to be said that, generally speaking, there is little in the way of clear awareness of problems which especially affect the excluded

But one often has the impression that their problems are brought up as an after-thought, a question which gets added almost out of duty or in a tangential way

Today, however, we must realize that a true ecological approach *always* becomes a social approach; it must integrate questions of justice in debates on the environment, so as to hear *both the cry of the earth and the cry of the poor.*”

Pope Francis 2015: Laudato Si: On Care for Our Common Home (Paras 48,49)

AN APPEAL

The **Janakiya Padana Samithi** wishes to draw your attention to a matter of utmost significance pertaining to the utilization of our beaches and coastal seas.

At present, marked by the imminent threat of climate change, there exists an imperative need to ensure the balanced and judicious management of these natural assets. We need to encompass both the socio-cultural priorities of fishing communities; the vital role of beaches and the adjoining coastal sea as spaces of leisure and rejuvenation for the larger citizenry; and the lucrative economic benefits from decentralised, community-oriented, beach tourism and sea-related sports activities.

Our beaches serve as conduits for the transmission of cultural heritage, particularly for fishing communities whose traditions and livelihoods are deeply intertwined with the sea. The historical and intergenerational practices of fishing are not solely economic in nature, but represent an embodiment of communal identity and shared values.

Amidst the escalating challenges posed by climate change, the preservation of this natural coastal environment is of paramount importance. Beaches in their unspoiled form are landscapes which function as primary buffers against the encroaching sea, shielding human settlements from the advancing tides and intensifying storms. A conversion to mindless commercialized developments could severely undermine this natural barrier, exposing our communities to increased vulnerability.

We advocate for a comprehensive approach that accommodates the needs of both fishing communities and the wider public, while preserving the ecological integrity of these natural ecosystems. We believe that development plans, undertaken with the fullest participation of coastal communities and larger civil society, can be carefully calibrated to strike a harmonious balance between economic interests, cultural preservation, and natural protection. Sustainable tourism practices and environmentally conscious designs can coalesce to ensure responsible utilization, minimizing the deleterious impact on beaches and coastal ecosystems.

In conclusion, we seek your esteemed attention to this pressing concern. By adopting a conscientious stance that prioritizes cultural heritage, community well-being, and ecological sustainability, we can collectively safeguard our coastal beaches for present and future generations. Let us endeavor to forge a path that respects our historical legacies, while nurturing the shared spaces that facilitate our societal harmony.

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List of Abbreviations, Boxes, Tables

AONB	Areas of Outstanding Natural Beauty
APSEZL	Adani Ports and Special Economic Zones Limited
AVPPL	Adani Vizhinjam Port Private Limited
CA	Concessionaire Agreement
CAG	Comptroller and Auditor General
CAO	Compliance Advisor Ombudsman
CEIA	Comprehensive Environment Impact Assessment
CMFRI	Central Marine Fisheries Research Institute
COD	Commercial Operation Date
CRZ	Coastal Regulation Zone
CZMP	Coastal Zone Management Plan
DEA	Department of Economic Affairs
DPR	Detailed Project Report
EAC	Environment Appraisal Committee
EC	Environment Clearance
EIA	Environment Impact Assessment
EPC	Engineering Procurement and Construction
ESIA	Environment and Social Impact Assessment
FML	Friends of Marine Life
GoI	Government of India
GoK	Government of Kerala
HTL	High Tide Line
HUDCO	Housing and Urban Development Company
ICESCR	International Covenant on Economic Social and Cultural Rights
ICCPR	International Covenant on Cultural and Political Rights
ICMAM	Integrated Coastal and Marine Area Management
IFC	International Finance Corporation
ISPS	International Ships and Ports Security

IUCN	International Union for Conservation of Nature
JPS	Janakeeya Padana Samithi
JSS	Janakeeya Samara Samithi
JRC	Justice Ramachandran Committee
KFC	Kerala Finance Corporation
KSBB	Kerala State Biodiversity Board
KSHRC	Kerala State Human Right Commission
LDF	Left Democratic Front
LTL	Low Tide Line
LSG	Local Self Government
MBR	Marine Biosphere Reserve
MCA	Model Concession Agreement
MPA	Marine Protected Area
MoEFCC	Ministry of Environment Forests and Climate Change
NCCR	National Centre for Coastal Research
NCSCM	National Centre for Sustainable Coastal Management
NCESS	National Centre for Earth Science Studies
NGT	National Green Tribunal
NGO	Non-Government Organisation
NIOT	National Institute of Ocean Technology
PPP	Public Private Partnership
REIA	Rapid Environment Impact Assessment
REOI	Request for Expression of Interest
RFP	Request for Proposal
RFQ	Request for Quotation
SDG	Sustainable Development Goals
SDP	State Domestic Product
SIA	Social Impact Assessment
SLO	Social Licence to Operate
TEU	Twenty-foot Equivalent Units
TPC	Total Project Costs

UDF	United Democratic Front
UNCLOS	United Nations Convention on the Law of the Sea
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNDRD	United Nations Declaration on the Right to Development
UNUDHR	United Nations Universal Declaration of Human Rights
VGf	Viability Gap Funding
VIS	Vizhinjam International Seaport
VISL	Vizhinjam International Seaport Limited
VRC	Vessel Related Charges

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Preface

The title of our Report "**Our Beaches, Our Sea: Heritage of Fishing Communities, Usufruct of All Citizens**" aims to emphasize the profound significance of beaches and the adjacent sea in the historical, occupational, social, and cultural context of fishing communities. These coastal spaces form the bedrock of their livelihood, well-being, and identity.

We emphasize that beaches are more than just sandy terrains at the confluence of land and sea. They should not be treated as commodities for private interests or subject to inappropriate infrastructure development. Beaches and the nearby coastal waters are essential for the livelihoods of active fisherfolk, a fundamental right, and a heritage right. Moreover, they provide all citizens the chance to appreciate and enjoy these crucial resources.

The establishment of the Vizhinjam International Seaport (VIS)¹, by the Vizhinjam International Seaport Limited (VISL) of the Government of Kerala, has proceeded without any consideration of the above rights.

The port has been a subject of controversy since its inception due to the social and environmental concerns surrounding the livelihoods of coastal communities. This coastal region harbours the highest concentration of traditional fishermen, with the densest population among all coastal villages in the country. The various construction activities planned for the port have significant adverse effects on the livelihoods and safety of the fishing community, the stability of beaches and shorelines, and the preservation of biodiversity. Unfortunately, cultural heritage, aesthetics, and the exceptional natural beauty of the area received minimal consideration during the project's planning phase.

The apprehension within the fishing community regarding the potential impacts of the Vizhinjam Port were rooted in the distressing experiences stemming from severe coastal erosion and the loss of homes north of a small fishing harbour like Muthalapozhi in Thiruvananthapuram District. The fishing community made extensive efforts to convey their concerns to authorities at various levels regarding the potential repercussions of another, much larger port construction at Vizhinjam. Regrettably, environmental clearance (EC) for the project was granted without giving adequate attention to the very legitimate concerns of the fishing community.

The Vizhinjam International Seaport Limited obtained EC by allegedly misrepresenting and manipulating data related to shoreline changes, livelihoods, and biodiversity in the Detailed Project Report (DPR) and Environmental Impact Assessment (EIA). This was purportedly done through political pressure. As the port construction advances, many claims made in the DPR and EIA stand exposed and are being proven false. Monsoonal erosion along adjacent coasts has

¹ There is need to distinguish between the port and the company. It was only in September 2023 that the port was given the official brand name of "Vizhinjam International Seaport (VIS). However, in this report we maintain the practice of referring to the company "Vizhinjam International Seaport Limited" (VISL) which was registered in 2004 as the legal entity.

become increasingly severe, compelling people to vacate their homes and relocate to makeshift camps with inadequate amenities. What was once a safe fishing harbor at Vizhinjam has now become perilous for fishermen. Disruptions to regular fishing activities have become a routine occurrence.

Exasperated by these difficulties, the fishing community initially turned to the government for assistance, but their endeavours proved futile. In the end, they had no choice but to organize an agitation, which was concluded only upon receiving commitments from the government. Nevertheless, the government-appointed Expert Committee, led by Shri M.D. Kudale, fell short of fulfilling its promise to include a representative nominated by the fishermen, and its terms of reference (ToR) were limited in its scope to examining coastal erosion, mitigation measures. At a later stage, the need to study the impact of the port on fishing activities and marine ecosystems was added to the ToR.

In response to these circumstances, the **Janakeeya Samara Samithi**, which led the agitation, formed a **Janakeeya Padana Samithi (JPS)** consisting of oceanographers, scientists, and social scientists to address comprehensively the issues arising during the construction process and those that may emerge once the port becomes operational.

The JPS convened both online and offline meetings, collated information through commissioned studies with community participation, held public consultations, conducted site visits, and consulted with experts. Various studies pertaining to Vizhinjam and the Thiruvananthapuram coast on hydrodynamics, coastal morpho dynamics, the impact of coastal structures, biodiversity, and the socio-economics of fishing communities were referenced. Additionally, reports on shoreline changes, as directed by the National Green Tribunal (NGT) and the Ministry of Environment, Forest, and Climate Change (MoEFCC), were reviewed. The JPS also made a detailed examination of the Comptroller and Auditor General (CAG) of India's critical assessment of the Concession Agreement entered by the VISL with Adani Vizhinjam Port Private Limited (AVPPL) for this Public-Private Partnership (PPP) project.

Given the unique social fabric, ecological significance, and coastal dynamics of the region, the JPS is of the firm opinion that Vizhinjam is an unsuitable location for a port of such magnitude and intensity of activities. Our Report scientifically and convincingly documents the loss of beaches and homes, the escalating impacts of monsoonal erosion, the significant depletion of biodiversity, and the adverse effects on the livelihoods of coastal communities as the port construction advances. It unequivocally reveals that the Vizhinjam port project constitutes a massive misadventure at the expense of the fishermen and the environment.

Furthermore, this report elaborates on the inappropriate execution of the Concession Agreement and the financial concessions granted to the concessionaire, AVPPL, at the expense of the public exchequer. It also presents a path forward for the fishing and coastal communities considering the growing risks and hazards associated with the port, supported by expert insights and community input, for the consideration of the relevant authorities.

This report represents a collective effort of the Committee, with esteemed members including Dr. John Kurien (Former Professor, Centre for Development Studies, Thiruvananthapuram), Dr. K G Thara (Former Member Secretary, Kerala State Disaster Management Authority), Dr. Terry Machado (Former Scientist, NCESS, Thiruvananthapuram), Mr. Probir Banerjee (President, Ponds CAN, - Pondicherry), Dr. Sarita Fernandez (Managing Trustee, Ocean Coastal and Ecological Alliance Network, Goa) and Dr. Johnson Jament (Research Fellow, School of Global Studies, Faculty of Anthropology, University of Sussex, United Kingdom)

The Committee derives assurance from the valuable feedback provided by experts who reviewed the report and the insights shared during the brainstorming workshop. We believe that the public will gain a profound understanding of the significant and genuine concerns of the fishing and coastal communities and the evident neglect by VISL, AVPPL, and the Government of Kerala. We hope this will lead to an outpouring of support and solidarity with the suffering fishing community.

K V Thomas

Chairman, Janakeeya Padana Samithi (JPS)

(Former Dean, Kerala University of Fisheries & Ocean Studies, Kochi & Former Scientist G, National Centre for Earth Science Studies, Thiruvananthapuram)



Preamble

This report comes at a crucial juncture when the concern over investments that endanger the environment and society is at an all-time high. This context puts the spotlight on the catastrophic storm brewing along Kerala's coastline as a sprawling port project unleashes a relentless wave of environmental and social destruction. Coastal erosion, the loss of homes, and the decimation of fishing livelihoods have become the bitter price of this ill-conceived endeavour. More troubling is the response thus far from those in power—a puzzling denial of the problem, often attributing the erosion to global climate change, or worse, constructing seawalls in the name of protection, which only serves to exacerbate the issues they claim to address. The consequences are far-reaching, affecting not only the coastal communities who have called these shores home for generations but also the precious but fragile biodiversity and tourism that once revelled in the beauty of these sandy beaches.

To be crystal clear, this commentary is not a quest to block development that benefits the state; rather, it is a plea for environmentally and socially sustainable development that is the only viable path for Kerala. What we face is a mega-project devoid of essential environmental and social safeguards, a behemoth controlled by corporate interests driven solely by private profits, with little regard for the fragile ecosystem and the loss of traditional occupations. The conundrum is also the lopsided financial equation that underlies the project. Much of the investment is made by the Government of Kerala, drawing from its own finances, and borrowing heavily from financial institutions, while the livelihoods of fishing communities and sustainable interests of the common people are recklessly mortgaged. The call previously made by analysts to revamp the design, implementation and financials of the project still hold, only with a greater sense of urgency and concern.

This report is a wake-up call, a cry for a more sustainable path toward development—one that protects our environment, upholds human rights, values our coastal communities, and secures a brighter future for future generations.

**

1. Introduction

Our sandy beaches, a realm where the sea and waves embrace, serve as the very playground of the ocean itself. Perhaps it is wisest to entrust them to the waves and tides that shape them.

The synergy between beaches and the coastal sea is profound and ecological. These stretches of shoreline, along with the encompassing sea, stand as the cherished legacy of our fishing communities, deeply woven into their livelihoods and cultural tapestry. It is crucial to recognize that the protection of these ecosystems is not only a matter of environmental conservation but also a fundamental human rights issue, as articulated by the United Nations.

Wherever these communities reside along our nation's beaches, it is their birthright to be the guardians of these coastal domains. These ancestral rights have, however, been overshadowed and diminished by more politically influential contenders, who have both encroached upon and wrested control of the coastal expanse.

As the sun rises over the horizon, casting a warm golden hue on the tranquil waters, the rights enshrined in the Universal Declaration of Human Rights (UNDHR) come to life. Article 3, which states that "everyone has the right to life, liberty, and security of person," resonates with the fishing communities who depend on these ecosystems for their livelihood. The protection of these pristine habitats directly correlates with the safeguarding of their human rights.

The United Nations Convention on the Law of the Sea (UNCLOS) echoes the sentiment, recognizing the importance of marine environments and coastal ecosystems. Under UNCLOS, coastal states are entrusted with the responsibility to ensure the sustainable management and conservation of these vital ecosystems, which is intricately linked to the well-being and livelihoods of fishing communities.

In this context, it is also essential to remember the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which underscores the rights of indigenous fishing communities to their traditional lands, territories, and resources. These communities, with their deep-rooted knowledge and sustainable practices, play an essential role in safeguarding the ecological balance of the coastal areas.

Functioning as a natural shield for the coast, our beaches fulfill a critical role. Moreover, they represent a shared haven for every citizen of this country – both present and those yet to come – granting the privilege of forging intimate, aesthetic, and spiritual connections with the sea and its granulated embrace.

Intricately linked, the beach and sea form a cohesive coastal ecosystem, where their interplay is paramount. The beach, a vibrant and ever-changing realm, stands as an integral part of the coastal zone, that pivotal junction where land and sea coalesce in harmonious transition.

Here are some key aspects of the relationship between the beach and the coastal ecosystem:

1. **Habitat and Biodiversity:** The beach is a crucial habitat within the coastal ecosystem, providing a unique environment for a variety of plants and animals. Many species of birds, crabs, insects, and small marine creatures rely on the beach for nesting, feeding, and breeding. This biodiversity is not only essential for the health of the ecosystem but also for the cultural and economic well-being of fishing communities.
2. **Sand Dunes:** Beaches are often accompanied by sand dunes and sand dune vegetation, which are important for stabilizing the shoreline, protecting the land from erosion, and serving as natural barriers against storm surges and tsunamis. These dunes are not just geological features; they are part of the coastal ecosystem that fishing communities depend on for their livelihoods.
3. **Nutrient Cycling:** The beach plays a role in nutrient cycling within the coastal ecosystem. Organic matter, such as seaweed and dead organisms, washes up onto the beach, contributing nutrients that can be utilized by various organisms, including the ones that support the local fisheries.
4. **Sediment Transport:** Beaches are the major contributor to the 'river of sand' that constitutes sediment transport in the beach-littoral sea system. Beaches are therefore critical in the process of sediment transport along the coastline, influencing the distribution of marine life that sustains fishing communities.
5. **Coastal Protection:** Healthy beaches and dunes act as natural coastal protection mechanisms. They can reduce the impact of storms, erosion, and sea-level rise on the adjoining coastal areas, helping to protect human communities and infrastructure, including the homes and livelihoods of fishing communities.
6. **Community and Recreation:** Beaches hold a deep connection to the livelihoods and traditions of fishing communities. Beaches are popular destinations for recreation and tourism, contributing significantly to the local and regional economies. Ensuring the health and preservation of these ecosystems is crucial for the sustainability of fishing and the economic well-being of these communities.
7. **Climate Change Resilience:** Coastal ecosystems, including beaches, play a crucial role in mitigating the impacts of climate change. They act as carbon sinks, sequestering carbon dioxide from the atmosphere, and provide natural defenses against rising sea levels and extreme weather events, which can directly impact the living conditions and human rights of fishing communities.

However, coastal ecosystems, including beaches, are facing numerous threats, such as coastal development, pollution, habitat destruction, and climate change. Human activities, including improper waste disposal and coastal construction, can disrupt the delicate balance of the coastal ecosystem and lead to the degradation of beaches and their associated habitats, thereby putting fishing communities' human rights at risk.

To ensure the long-term health and resilience of the beach and coastal ecosystem, it is essential to implement sustainable management practices, protect critical habitats, and promote

conservation efforts that consider the ecological, economic, and social aspects of coastal environments. These actions align with the United Nations' call to celebrate the 'Decade on Ecosystem Restoration' and the 'Decade of Ocean Science for Sustainable Development,' which emphasize the interconnectedness of environmental protection, human rights, and sustainable development. These are the offshoots of the declaration of 17 Sustainable Development Goals (SDGs) by the UN in 2017 of which SGD 14 is on 'Life under Water'.

International human rights law, through the International Covenant on Economic, Social and Cultural Rights (ICESCR), reinforces the importance of ensuring adequate standards of living, including food and housing. Fishing communities depend on the sea for their sustenance, making it imperative to protect the ecosystems that provide for their basic needs.

The right to participation, as outlined in the UN Declaration on the Right to Development (UNDRD), extends to fishing communities' involvement in decision-making processes that affect their way of life. It underscores the importance of inclusive and sustainable development, ensuring that their human rights are respected and upheld.

Our country is a party to all these declarations and it is our duty to protect and restore our degraded and destroyed ecosystems and associated geomorphology. Countries world over, including India, are taking all the efforts to restore destroyed and degraded ecosystems.

Contrary to the spirit of these UN declarations, the development of the Vizhinjam International Seaport, which has the potential to damage the very sensitive coastal and marine ecosystem and geomorphology, has been taken up recently as a 'dream project.'

Such interventions have all the potential to cause large-scale destruction/damage to the coastal and marine system, affecting marine biodiversity, the sole livelihood, as well as the occupational and cultural spaces of an already marginalized fisher community. It is imperative to consider the principles of environmental protection, human rights, and sustainable development in such endeavors to ensure the well-being of fishing communities and the preservation of their rights.

The construction of the Vizhinjam International Seaport, for the Vizhinjam International Seaport Limited (VISL) by Adani Vizhinjam Port Private Limited (AVPPL), must be investigated and analysed from all these perspectives.

This is the Report of the **Janakiya Padana Samithi (JPS)** which was constituted by the Samara Samithi of the fishing communities in the Thiruvananthapuram District in November 2022 and mandated to:

1. ***Make a more holistic approach and examine the geomorphological, ecological and livelihood impacts of the overall construction activities which have been undertaken by VISL and the Adani Vizhinjam Port PVT Ltd from 2015 till to date and present the findings to the public and the Government.***
2. ***Examine the livelihood disruption and financial loss incurred by the coastal community because of the erosion and attempt to provide data to establish the relationship between the construction of the port and the loss of houses and lives of fishers on the coast.***
3. ***Assess the possible impacts of the remaining construction activities as well as other economic and social implications if, and when, the seaport becomes operational.***
4. ***Provide suggestions on the immediate and long-term remedial measures to be taken to protect the coastal space and coastal communities from global climate change and the impacts of local coastal structures.***

The Chair and Members of the Janakiya Padana Samithi are:

1	Dr. K.V. Thomas (Chairperson)	Former Dean, Kerala University of Fisheries and Ocean Studies, Kochi and Former Scientist G and Group Head, NCESS, Thiruvananthapuram.
Members		
2	Mr. Probir Banerjee	President, Pondy CAN, - Pondicherry (Involved in Restoration of Coast and Coastal Wetlands)
3	Ms. Sarita Fernandez	Managing Trustee, Ocean Coastal and Ecological Alliance Network (OCEAN), Goa
4	Dr. John Kurien	Former Professor, Centre for Development Studies, Thiruvananthapuram
5	Dr. Terry Machado	Former Scientist, NCESS, Thiruvananthapuram
6	Dr. K.G. Thara	Former Member Disaster Management Authority, Govt. of Kerala and Former Head, Disaster Management Centre, Revenue Dept. Govt. of Kerala.
Co-opted Member		
7	Dr. Johnson Jament	Research Fellow, School of Global Studies, Faculty of Anthropology, University of Sussex, United Kingdom

**

2. On Vizhinjam

Vizhinjam (Long: E. 76° 59'15", Lat: N. 8° 22' 30"), located on the southern outskirts of Thiruvananthapuram District, along the south-west coast of India, is a scenic coastal village, that unfolds its charm against the backdrop of the Arabian Sea. Nestled within two jutting rocky promontories², it cradles a sheltered bay area, a true haven from the embrace of the ocean. The symphony of the sea, idyllic pocket beaches, dramatic cliffs, rolling hills, and graceful coconut palms coalesce harmoniously, to orchestrate an awe-inspiring symphony of nature's grandeur.



Fig 2.1: A view of nature's grandeur in Vizhinjam

Source: Wikimedia

The history of Vizhinjam dates to The Ay Dynasty (8th to 11th century AD) who ruled the region before the Cheras established themselves as a major force in Kerala. Vizhinjam was their capital where they built a fort which is now considered to be the oldest fort in Kerala dating to the eighth or ninth century CE.

Throughout ancient times, Vizhinjam gained recognition due to the presence of the Ay fort and the natural fair-weather port, which has been extensively praised by early historians. Recent excavations and academic studies have shed light on Vizhinjam's historical significance (Sajeev Singh, 2018).

² Mathilpuram on the western side and Kottapuram on the eastern side

Vizhinjam's strategic and maritime importance in shaping the political landscape of the era is evident as it served as a state capital and a hub for maritime trade. The excavations also brought to light the evidences of ancient international maritime trade connection between Vizhinjam and other civilisations to the west and east of India. (Joseph, A et al 2019)



Fig 2.2: Location of Vizhinjam

Source: AECOM DPR May 2013

Just another fishing village?

In the public eye today, Vizhinjam is just a densely populated fishing village with fishers belonging to the Christian, Islamic and Hindu traditions.

Most of the fishers are Mukkuvars – Christian (officially Latin Catholic). But there is a significant presence of Muslim fishermen, and to a lesser extent, Hindu fishermen in the Vizhinjam zone. While the Christian fishers venture out to sea all the year round, the Muslim and Hindu fishermen largely collect mussels and undertake very near-shore fishing.

Despite Vizhinjam's rich historical significance, the present-day fishing communities residing there are often unfairly characterized as anomalies or 'outliers' within Kerala's society (Kurien J, 1995). These communities, especially the Christian fishermen, have been subjected to a process

of "othering," where mainstream civil society and political actors tend to view them as distinct and at times marginalized.

In the past, fishing communities were primarily recognized and courted only during election periods due to their substantial voting influence, which was sometimes perceived as easily manipulable. However, this paradigm has shifted over the years. These communities have experienced social development and benefited from welfare initiatives, thanks to their own collective struggles in the 1980s. As a result, they have become more aware of their rights as citizens and have grown increasingly conscious of their social, cultural, and political significance.

Today, Vizhinjam epitomizes this new found awareness.



Fig 2.3: Vizhinjam: The village in transition

Vizhinjam is today the largest and most important fishing village in Kerala if one measures it with the numerical indicators of relevance to an artisanal small-scale fishery.

Going by the most recently available data from the CMFRI (2016),

In Kerala State, Vizhinjam village has:

- the largest number of fishing families (4483)
- the biggest population (17,858)
- the greatest number of full-time fishers (4950)
- the largest number of traditional fishing crafts (1622)
- the highest number of out-board motors (1492).

Vizhinjam is also the village which, unlike other villages, is 'shared' by all the fishermen of the region. Vizhinjam has traditionally been the place for safe launching and beaching of traditional fishing crafts during the monsoon months. The fishers of Vizhinjam **do not own** a single mechanized fishing trawler, ring-seine vessel, or gillnetter.

Fishermen from as far north as Anjengo in Thiruvananthapuram District, to as far south as Colachel in Kanyakumari District of Tamilnadu have historically migrated to Vizhinjam along with their craft and gear for fishing during the peak monsoon months. However, after the construction of Muthalapozi Harbour in the north of the district and the Thengappattanam harbour in the south in Kanyakumari District, their numbers have reduced.

Yet, even today, the Vizhinjam harbour accommodates about 30,000 fishers during the southwest monsoon season.

The most important natural feature of the coastal waters off Vizhinjam are its numerous natural rocky reefs in the near shore area which results in significant primary productivity of the coastal waters. Consequently, fishing can be conducted closer to the coast and using ecologically benign fishing methods. The huge marine biodiversity also means that the knowledge of the fishers about the sea and its resources is phenomenal. The resource diversity is reflected in the fishing gear diversity – nets are specie and season specific in their use. The result is more sustainable fishing.

The traditional, artisanal fishermen in the area have also made a large contribution in the preparation of a marine biodiversity register of Thiruvananthapuram District, which is the first of its kind in the country. It was published by the Kerala State Biodiversity Board. Moreover, it is these traditional fishermen who have seen and known the sea creatures that are now extinct, hidden and currently undocumented in the sea.

The fishing industry is the most important primary activity in Vizhinjam. It generates substantial income and employment along the coastal tract. The fish harvested is a source of food security in the immediate and distant hinterland of the coast and often the protein of the poor. Several fish species also cater to a vibrant export market and contribute to substantial foreign exchange earnings.

For centuries, therefore, it is the fishing communities of Vizhinjam – belonging to Christian, Muslim, and Hindu religious traditions – who have defined and exercised rights and shared responsibilities over the beaches and coastal ecosystems. They decided who is allowed to use which resources, in what manner, for how long, and under what conditions. They acknowledged the different entitlements to resources, and the differentiated responsibilities for managing them creating informal and customary forms of tenure. It is these tenurial forms that are the foundation for their collective cultural values which are passed down from generation to generation as a heritage.

Vizhinjam beyond fishing

Vizhinjam and its neighbouring areas – Kovalam at the north of the fishing harbour, and the beaches at the south, are internationally renowned tourist destinations.

These beach areas have been the focus of foreign tourism in southwestern India for the past 50 years and continues to figure prominently in tourism development plans of Kerala State.

The main attraction are pristine beaches, cliffs, pocket beaches and water-related tourism which is premised on the rocky reefs relatively close to the beach. Many tourist entrepreneurs offer to take tourists to snorkelling sites by small canoes with the help of youth from the fishing communities. The attraction has been the rich marine biodiversity, especially the presence of ornamental fish. Water-related tourism provides a significant economic opportunity for residents of this village and neighbouring villages.

With the increasing number of young Keralite and non-Keralites in the IT industry, the beaches of this region have also become a favourite destination for them. For most other domestic tourists, the pocket beaches of Vizhinjam-Kovalam are also a 'must-experience' on their holiday agendas.

Port Dreams for Vizhinjam?

The natural harbor, ideal for a port, first attracted the interest of colonial forces. It was the dream of many rulers and governments.

Inspired by its suitability as a port, the Travancore ruler Regent Rani Sethu Lakshmi Bayi, with the assistance of Sir C.P. Ramaswami Aiyar, the Diwan of Travancore considered a possibility of developing a commercial port at Vizhinjam. Funds were allocated, and plans initiated, but the project encountered 'setbacks' after the consolidation of Travancore-Cochin states.

An interesting historical question worthy of investigation would be the reasons behind the 'setbacks' encountered. Why then did the Travancore Government later decide to develop a port in the village of Valiyathura and drop the idea of a port at Vizhinjam? Was the decision based only on socio-political considerations? Was the fact that Vizhinjam was historically only a 'fair-weather port' one of the reasons for dropping it? We do not know³.

At Valiyathura a port with a 214-metre-long pier supported on concrete piles with two cranes to load and unload cargo into four godowns was opened in 1956⁴. At that time it was the only port

³ It is interesting to note that the British (East India Company) and the Dutch preferred Colachel (40 km south of Vizhinjam) and Anchuthengu (40 km north of Vizhinjam) for their maritime activities and port facilities instead of Vizhinjam.

⁴ A team of divers of the Friends of Marine Life (FML) found remains of what was the first pier at Valiyathura which was built in 1825 and destroyed when a steamer crashed into it in 1947 killing 20 persons. It could be that the decision to re-build Valiyathura pier was also due to calls by influential local people to "demand a new pier and to protest the delay in opening the port after the

in the south coast of Travancore. The large ships of that age could not dock at the pier because of lack of depth. The cargo had to be bought to port by smaller carrier vessels.

With the idea of a 'dream' port at Vizhinjam dropped, an expert committee functioning between 1955-57, advocated instead for a fishing harbor. The concept of the fishing harbor was conceived by a Swedish expert in the 1960s. The fishing harbour project was not without controversy. The land acquisition process resulted in the displacement of residents without any rehabilitation efforts. This led to protests. The government halted the acquisition but offering no compensation to the affected people (Joseph, A et al 2019).

The Government of Kerala (GoK) eventually approved the first phase of the fishing harbor between 1968-1974. The subsequent phases were sanctioned in 1977 and 1983, respectively, which involved acquiring forty hectares of land and displacing numerous fishermen from their homes.

Till the 1990s Vizhinjam was known only for its fishing harbour. This harbour was a great boon to the fishers of the whole district who would converge there for varying periods of time during the monsoon months from May to September.



Fig 2.4: Pillar elected when starting the Vizhinjam Fishing Harbour construction Credit: Alphonsa Joseph

pier was damaged, leading to unemployment among the port workers." This is confirmed by a printed pamphlet from March 24, 1950. Perhaps the decision by the Travancore Government to drop the idea of Vizhinjam for a new port is also related to this. <https://www.thehindu.com/news/national/kerala/pieces-of-history-dug-up-from-ocean-bed-near-valiathura/article5676638.ece> (accessed 15 August 2023)

The new millennium however stirred the imagination of the politicians in Kerala and they have since never given up on trying to realise the dream of turning Vizhinjam into the Singapore of South Asia.



Fig 2.5: Vizhinjam Rock Cut Temple Source: Wikimedia

Other Dreams are Possible for Vizhinjam

The fishing communities and the new young citizens of Kerala have different dreams for Vizhinjam. They are not against infrastructure development which is in keeping with the tune of nature and the essential socio-economic needs of the state.

The fishermen aspire to exercise their fundamental human right to continue their longstanding occupation. Many educated youths within the community have deliberately chosen to remain engaged in fishing due to its viability as a sustainable and profitable self-employment option. They adopt modern, small-scale, technology-driven fishing techniques and have developed innovative approaches to directly connect with consumers through their established institutional systems. The shoreline and sea hold deep cultural significance for them.

For the newer generation of Kerala's young residents, places like Vizhinjam and its picturesque surroundings, including the renowned Kovalam beach, offer spaces for relaxation and inner rejuvenation through a connection with nature. With increasing incomes and evolving ambitions, they look for accessible and enriching avenues for leisure. The beach and the sea function as 'common' areas where they possess the 'right to explore and the right to relish' without being impeded by large corporate interests that seek to take over and privatize a heritage that belongs to the people.

Vizhinjam is a sterling example where the beaches and the sea combine well as the heritage of fishing communities and the usufruct of all citizens.

3. How VISL Contracted Adani Vizhinjam Ports Private Ltd

In the 1990s, there were discussions about constructing an international seaport at Vizhinjam, but due to opposition from locals and the tourism industry, these plans were abandoned. Between 1990s and 2000 the plans for Vizhinjam were kept in cold storage.

The United Democratic Front (UDF) Government in 2003 commissioned a Rapid Environment Impact Assessment (REIA) with the objective of developing Vizhinjam Port with private participation. The REIA conducted by L&T-Ramboll Consulting Engineers was delivered on February 2004. The Government of Kerala registered the Vizhinjam International Seaport Limited (VISL) in December 2004 as a Special Purpose Company. One of the main objectives is to establish a new port at Vizhinjam, located near the State capital of Trivandrum.

The UDF Government conducted two rounds of bids between 2005 and 2006 for this project. However, the selected consortium in the first round -- Zoom Developers -- had their bid cancelled as it failed to obtain security clearance from the Government of India after it was found to have Chinese investment in it. In the second round, a bidder challenged the evaluation process, resulting in the winning bidder eventually withdrawing after receiving a Letter of Award. Most of the bidders in the second round were consortia led by construction companies.

In November 2009, the Left Democratic Front (LDF) Government in power then, enlisted the help of International Finance Corporation (IFC) to facilitate a well-structured and transparent bidding process. The first step involved a market assessment conducted by a team led by an international expert from Drewry Shipping in the UK. This was when the idea of creating a transshipment port at Vizhinjam was first mooted.

This IFC assessment revealed that the projected traffic at Vizhinjam had significantly decreased in the changed economic environment after the global economic crisis of 2008-09, compared to the previous round of bidding. Drewry also indicated that, due to its limited immediate hinterland economic activity, Vizhinjam's greatest potential lay in attracting container transshipment traffic. However, the competition from ports like Colombo and Vallarpadam meant that Vizhinjam would need to competitively price its container handling services to attract traffic away from its rivals.

IFC said the financial viability of the project could be achieved only with Government support. However, the LDF accepted in 2010 the IFC report and agreed to set up a port in Public-Private-Partnership (PPP) mode with government support and set up an Empowered Committee with Chief Secretary as chair to float tenders.

The IFC study, had flagged that one of the key issues to be addressed to speed up establishing a port was that:

During the initial community consultation fishing communities have expressed apprehensions that the port will adversely affect their livelihood. This needs to be proactively discussed with the affected communities and addressed on a priority. Further, during these initial consultations (and as per some press reports), affected communities have expressed an anxiety pertaining to the compensation for loss of land and livelihood. The communities have expressed a desire for adequate compensation for loss of land or livelihood due to port development. This also needs to be proactively taken up early in the ESIA process (IFC, 2010:48)

The Request for Expression of Interest (REOI) Notice issued by VISL resulted in 30 companies expressing interest in the project by August 2010. Adani Ports SEZ did not get security clearance to bid for the project in 2010-11 as there was a stricture on them imposed by the United Progressive Alliance (UPA) government at the Centre. Only two bidders finally qualified in this round. Welspun Consortium quoted, what was considered at that time, a very high grant request (Rs 479 crores)⁵.

Between January 2011 and May 2011 the Government of Kerala, ruled by the LDF, made two submissions⁶ through VISL, to the then Ministry of Environment and Forests (MoEF) Expert Appraisal Committee (EAC) for Building/Construction Projects/Township and Area Development Projects, Coastal Regulation Zone, Infrastructure Development and Miscellaneous Projects for development of a green field port at Vizhinjam. This proposal was made just when the Vallarpadam Port, funded by the Central Government, was about to be commissioned.

The EAC at its 95th meeting held on 20th January 2011:

- Noted that Vallarpadam (Cochin) is being developed as a big container terminal and will go into operation by February 2011
- Suggested that VISL carry out a comprehensive study keeping in view the global scenario on container traffic and the apportionment of traffic-region wise to avoid haphazard and piecemeal growth of container terminal all along the coast-resulting in environmental degradation slowly but steadily, if this is not checked at appropriate time, the consequences will be disastrous in the long run.
- Cautioned that since Thiruvananthapuram District falls in High erosion zone as per the study of ICMAM, Ministry of Earth Sciences, VISL should examine and submit details of shore line changes at the proposed site with the time series satellite images

⁵ The UDF which came to power in May 2011 rejected the Welspun offer by a Government Order (GO) in August 2012 stating that the grant request to the government was too high.

⁶ The 95th and 99th meeting of the EAC held on 20 January 2011 and 11-12 May 2011 for Finalization of ToR for Vizhinjam International Container Transshipment Terminal at Trivandrum Kerala, by M/s Vizhinjam International Seaport Ltd. [F. No. 11-122/2010-IA.III]

- Observed that VISL come up with a concretized proposal fit for implementation as the current proposal itself remains a concept and further it does not appear to have been prepared in a professional way but done in a very casually manner without understanding its importance

The VISL reformulated their proposal and submitted it again to the EAC.

The EAC in its 99th meeting on 11-12 May 2011:

- Pointed out that the development of a commercial port at Vizhinjam may cause adverse impact on the fishing activity in and around the fisheries harbor thereby affecting the very livelihood of the fishing community. It is therefore necessary to study the location of nearby fishing ground and whether the beach is being used by local fisherman for landing their catch and if so, the number of people affected by the construction of the proposed facility within the proximity of fishing harbour.
- Emphasised that the VISL has not taken into consideration the effect of commissioning of Vallarpadam International Container Transshipment Terminal
- Suggested that the VISL revise the Techno economic Feasibility Study keeping in view the global scenario on container traffic and develop a Cargo Distribution Model for the apportionment of traffic to various competing Indian ports/ neighbourhood ports to avoid haphazard/ piecemeal growth of container terminals all along the coast -resulting in not only environmental degradation, slowly but steadily, but also unhealthy competition.
- Concluded that in view of the foregoing observations, the proposal for finalisation of TOR is deferred and shall be considered after the above observations are addressed and submitted for reconsideration

The results of the 2011 assembly elections were declared on 13th May 2011 two days after this EAC meeting. The LDF lost the elections in one of the closest fought elections in Kerala and the UDF came to power with a very small margin of 4 seats.

The new UDF government submitted the proposal to the EAC again at its 101th meeting on 31 May 2011.

Between 11th May 2011 and 31st May 2011, the EAC made a new total reversal in its decision. There could have been no significant change in the objective conditions at Vizhinjam. The major change was political.

Very strangely, at the EAC Meeting, although fourteen different queries and doubts were expressed again about various economic, ecological, and social aspects of the VISL proposal, the EAC, at that same meeting arrives at a rather suspicious conclusion:

- **The Committee considering the public interest, decided to issue a project specific ToR (non-site-specific) and after the narrowing down, the site based on the site selection criteria, shall issue additional site-specific ToR.**

Several questions arise from this for which VISL is answerable:

How was the ‘public interest’ in the port project ascertained? Who is the ‘public’ in this case? Was there any free, prior, informed, consent obtained from any of the people living close to the proposed port or any persons whose livelihoods would be affected because of the port?

Box 1: The Course of the VISL ToR Application

The application for approval of the ToR for the ESIA study submitted by VISL was considered by the MoEF on 18th January, 2011 and advised to be resubmitted. The resubmitted application (April, 2011) was again considered by the EAC on 11th May 2011; 31st May 2011 and 23rd June 2011 along with a site appraisal by MoEF officials and the Hon. Union Minister of State for Environment & Forests, Sri. Jayaram Ramesh on 13th June 2011. The MoEF finally approved the ToR with additional project specific ToR (issued on 10th June 2011) and site-specific ToR (issued on 1st July 2011) in addition to the ToR submitted by VISL. As per the approved ToR, the ESIA study must be conducted in all the seasons (round the year) to have a holistic assessment of the impacts, including additional technical studies like historical & seasonal shoreline changes based on time series satellite imageries; mathematical modeling etc. to ascertain the impact of breakwater construction in the wave pattern, sedimentation pattern and shore line erosion etc.

Source: VISL Website

The final clearance of the ToR was granted at the 102nd meeting of the EAC on 23rd June 2011. The UDF then accepted the Planning Commission’s Model Concession Agreement (MCA) for port construction (of Gajendra Haldea fame)⁷.

In the MCA, the GoK and Government of India (GoI) were to share 40 % of the total cost. Then a Viability Gap Funding (VGF) of which the GoK was to bear 20 % share of VGF was to be obtained. Apart from this the cost of land, construction of external infrastructure and cost of breakwater were to be “funded works” to be borne by the GoK.

Between June 2011 and May 2013 the VISL was busy with arranging for the EIA for the project and rushing through the several studies and processes which are required to obtain the environmental clearance.

The VISL produced an EIA Report in May 2013 and Environment Clearance (EC) was obtained in January 2014. *(There are several questions about this EIA Report which we will address below)*

⁷ There is lack of clarity on whether this MCA was indeed an official document of the GoI, or the product of an Advisor to the Planning Commission – Gajendra Haldea – who published a document in 2000 on this concept which was to be used for public-private partnerships (PPP) for infrastructure projects. (See <http://www.gajendrahalea.in/> (accessed August 20, 2023))

Based on the above formula and the environment clearances obtained, an international tender was floated.

Government made the PPP (Public Private Partnership) and the EPC (Engineering, Procurement and Construction) as a composite project contract only on 1st March 2014 by issuing a GO just 10 days before the last day for the submission of the RFQ tender. Five bidders were qualified in the RFQ (Request for Quotation) stage but only three purchased the bid documents to participate in the RFP (Request for Proposal) stage. Strangely, it was only after identifying the three persons eligible to participate in the price-bid that the project details were finalized.

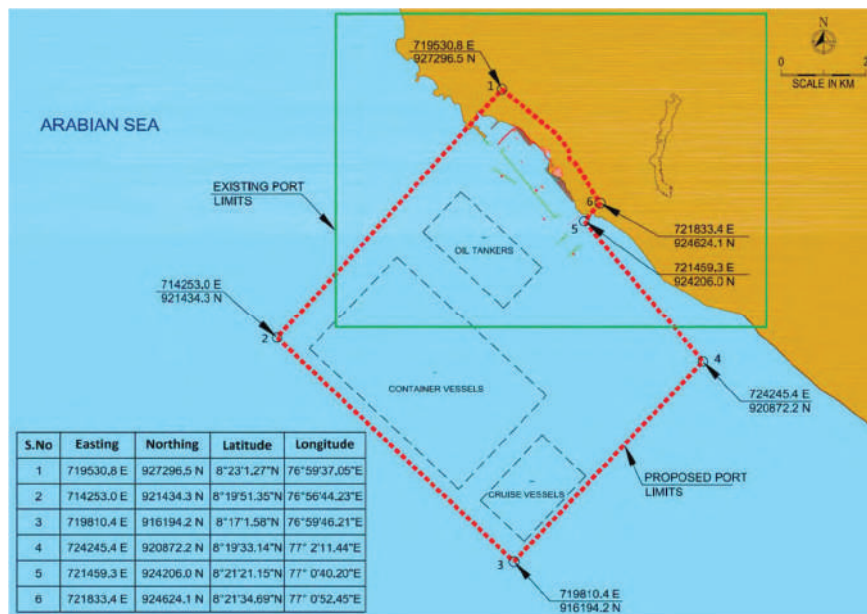


Fig 3.1: The land and sea area needed for the Vizhinjam Port

By this time (2014) a series of legal suits were filed before the National Green Tribunal questioning the validity of the procedures adopted by the Expert Appraisal Committee (EAC) in granting approval for the VISL to go ahead with the project. The main contention of the appellants was that the project is situated in a known high erosion zone and an area of outstanding beauty. This raised questions about the appropriateness of its location and the validity of the hasty and arbitrary permission granted for prior environment clearance for the project.

The BJP swept the national elections in May 2014 creating a very different perspective on infrastructural investments. They also had their different set of preferred business houses who had openly supported their election campaigns. The Adani Group was one of them.

However, in Kerala, notwithstanding all these public concerns about the impact that the project will have on the beaches, the coastal ecosystem, and the livelihood of the fishing communities, the VISL proceeded with business as usual.

In fact, even after supplying the RFP documents to three bidders, the Government went on changing the draft concession agreement through addendums. There were 17 addendums by 20th April 2015. Many of these addendums were extending the dates for submission and some of them introduced major changes in the project contract.

The most important change was the revision of the TPC (Total Project Cost) from Rs 3932 crores to Rs 4089 crores and the cost of “funded works” – those paid by government – from Rs 1210 crores to Rs. 1463 crores.

Also, a mortgage clause was introduced in the MCA thereby giving a totally different colour and content to the PPP project contract.

The central government approved ‘in principle’ the Viability Gap Funding for the project in February 2015

However, on last date for of bid submission, 20th February 2015, no bids were received!

The VISL requested CM Oommen Chandy to call Mr. Gautam Adani and request him to submit a bid! That was when the mortgage clause relating to port estate was added. Adani also demanded the GoK grant of 1635 crores. The date for submission was then extended to 24th April 2015.

Finally, the Adani Ports SEZ –submitted the RFP bid on the last day 24th April 2015 quoting a grant of 1635 crores (39.96%) of the TPC of Rs. 4089 crores

Though there is no legal infirmity in the award of the contract to the sole bidder, the question is whether the Government adopted the proper and right course of action in a situation like this.

However, what happened is that, in the case of this project, the details and conditions as advertised initially when tenders were invited is not the one ultimately awarded to the Concessionaire. This has denied competitive bidding benefit to the Government in the award of the contract. The Government of Kerala erred in the last stage of award of the contract when they proceeded to accept the sole bid fearing the “now or never” situation and to somehow or other claim credit for setting up of the port.

This project was to be operated under a Public Private Partnership (PPP) Model, with M/S Adani Ports and SEZ Private Limited as the sole concessionaire. Adani Ports claimed that being a natural port with a water depth of 18 meters, the dredging and maintenance costs would remain low. Nevertheless, concerns regarding land acquisition and displacement of inhabitants persisted, casting uncertainty over the project.

According to the Concession Agreement the port was to be completed in four years (2019) and the Concessionaire was given license to operate the port for 40 years with provision for extension for another 20 years on condition of expanding the capacity to 3 million TEUs (twenty feet equivalent units). GoK was to get 1 % revenue share from 15th year of commencement of

operations with increase of 1% per year subject to maximum of 40 percent. (55 years after start of operation). Adani could develop 30 % of port area for residential and commercial purposes given 10 % share of revenue to GoK from the 7th year of commencement of the port.

Based on this MCA, M/S Adani Vizhinjam Port PVT Ltd. (AVPPL)⁸ Limited and GoK, then governed by the UDF, signed an agreement on 17th August 2015.

While the entire procedure for the final award of the contract to AVPPL remains contentious, the more serious lapse in this convoluted process has been the questionable way the Environment Impact Assessment was formulated to obtain project clearance.

The process of obtaining Environmental Clearance (EC) for the Vizhinjam port project was marred by issues related to data fudging and misrepresentation of critical facts. The Environmental Impact Assessment (EIA) report presented to obtain the EC distorted or suppressed essential aspects, including social fabric, food security, livelihood security, biodiversity, and geomorphological significance within the project's impact zone. These discrepancies in data presentation raised questions about the transparency and accuracy of the environmental assessment process.

One significant misrepresentation pertained to the stability and vulnerability of the coast adjacent to the port site. The EIA falsely claimed that this coastal area was stable and least susceptible to erosion, contrary to scientific studies that had reported substantial erosion in the region. This misrepresentation obscured the actual environmental risks associated with the project.

The impact on biodiversity was downplayed in the EIA, while the Kerala State Biodiversity Board identified the Vizhinjam and adjoining coastal waters as a high biodiversity area. This region was recognized for its unique rocky reefs, which held critical importance for traditional fishers. The EIA's inaccurate portrayal of the impact on biodiversity minimized the potential ecological consequences of the port's construction.

Furthermore, the EIA report disregarded the "Area of Outstanding Natural Beauty" (AONB) designation for Vizhinjam's coastal cliffs and pocket beaches, which was meant to protect the characteristic cliff ecosystem and the area's aesthetics. By failing to acknowledge this ecological sensitivity, the EIA raised concerns about the preservation of the region's natural beauty and its role in maintaining the ecological balance.

⁸ AVPPL is a wholly owned subsidiary of APSEZL. It was incorporated on 27 July 2015. The State Government of Kerala through its special purpose vehicle (SPV), Vizhinjam International Seaport Ltd. (VISL) is developing a deep-water multi-purpose greenfield port at Vizhinjam on a design, build, finance, operate and transfer (DBFOT) basis and AVVPL is the private partner for developing the port. The Vizhinjam port is being designed to primarily cater to the trans-shipment and gateway container business. AVPPL commenced the construction of the port on December 5, 2015.



Fig 3.2: Eroding cliffs (photo of 2013) south of Vizhinjam Fishing harbour and very close to VIS site and toe protected by seawalls – Still the EIA claimed Vizhinjam and adjoining coasts as stable (Credit: Cyriac Kodoth)

The EIA also inaccurately claimed that the existing fishing harbor would remain unaffected by the port construction. However, accidents and fatalities involving fishermen increased after the construction of the breakwater, highlighting the misleading nature of these claims.

The discrepancy between the EC's statement of zero maintenance dredging and the Detailed Project Report's indication of a significant need for dredging further underscored the issues in the assessment process. Similarly, the claim of no capital dredging required was misleading, as a substantial amount of capital dredging was indeed necessary to achieve the desired draft for the port.

The project's strategic importance was also misrepresented in the EC approval process. Incorrect information, including a proposal for Navy and Coast Guard berths, which were later dropped, formed the basis for this strategic importance claim. The misrepresentation of strategic importance raised questions about the decision-making process leading to EC approval.

Additionally, the EIA and the Social Impact Assessment (SIA) inadequately addressed the significant impact on the livelihoods of traditional fishers, who predominantly rely on the coastal waters for their sustenance. This oversight further highlighted the shortcomings in evaluating the project's consequences.

Critical environmental factors such as long period swells and inlet dynamics were not adequately considered in the impact studies, contributing to an incomplete assessment of the project's environmental impact.

Finally, there were concerns about the site selection process and the evaluation of alternate sites. It was suggested that proper consideration of facts and alternatives may have led to a different decision by the Environmental Appraisal Committee (EAC). The overall discrepancy and manipulation of data and information in the EC approval process pointed to the need for a more transparent and comprehensive environmental assessment of projects like the Vizhinjam port.

In summary, the controversy surrounding the final award of the contract to AVPPL for the Vizhinjam port project is overshadowed by the alarming irregularities in the formulation of the Environmental Impact Assessment (EIA) that was crucial for project clearance. The EIA report exhibited a pattern of data distortion and omission, particularly concerning issues like coastal stability, biodiversity, Area of Outstanding Natural Beauty (AONB) designation, the impact on the existing fishing harbor, dredging requirements, strategic importance, and the livelihoods of traditional fishers. The inadequacies in addressing critical environmental factors and the site selection process further underscored the flawed nature of the environmental assessment. These discrepancies in the EIA, combined with misrepresentations and a lack of transparency in the Environmental Clearance (EC) approval process, call for a more comprehensive, honest, and transparent approach to environmental assessments for projects like the Vizhinjam port.

In Conclusion

The Vizhinjam port project's contract history is intertwined with several contentious issues. Beginning with the initial discussions in the 1990s, the project faced opposition, uncertainty, and political shifts. In 2015, the award of the contract to Adani Ports SEZ Ltd. (AVPPL) raised questions about the contractual process.

Moreover, the environmental assessment process for the project was marred by alarming irregularities. The Environmental Impact Assessment (EIA) report exhibited data distortion and omission, notably regarding coastal stability, biodiversity, the Area of Outstanding Natural Beauty (AONB) designation, the impact on the fishing harbor, dredging requirements, strategic importance, and the livelihoods of traditional fishers. The assessment failed to address critical environmental factors and the site selection process adequately, casting doubts on its transparency and accuracy.

This controversy highlights the urgent need for a more comprehensive, honest, and transparent approach to award of contracts and environmental assessments for large infrastructure projects like the Vizhinjam port.

4. Worries of VISL

The LDF which was in the opposition when the port agreement was signed in 2015 raised concerns about the way the project was granted to the Adani Group. It accused the UDF of corruption in the award of the tender.

However, when the UDF lost the elections held in May 2016, the LDF was saddled with a difficult choice about what to do about the Project. They settled to continue with it, in the interests of what it would bring in terms of a bright future for the Kerala economy. They stressed that the VISL was a government company and that Adani was only the project implementor, who was hoisted upon them by the UDF. The LDF claimed that their allegations about the corruption involved in the deal still hold.

Based on the batch of petitions against the project in 2014, the National Green Tribunal, in September 2016, pronounced its verdict rejecting the contentions of the appellants, but took the important step of constituting an Expert Committee which would closely monitor the impacts of the port construction on the beaches and the coastal ecosystem and make 6-monthly reports. The cost of this monitoring would be borne by the project proponent Adani Ports.

The VISL port activities were slowly becoming more contentious with the fishers, civil society and within government circles. This was particularly so after the Comptroller and Auditor General (CAG) of India, in one of the regular audits of public sector undertakings, gave a detailed analysis of the tendering process undertaken by the VISL and the final grant of the port to AVPPL.

The CAG Audit Comments

The Comptroller and Auditor General (CAG) of India, is a constitutional body, which examines and audits all the transactions that Central and State governments undertake that are related to funds, deposits, debts, etc.

In its report on public sector undertakings for the year 2016 conducted for the Government of Kerala (GoK), it devoted part of one chapter (Chapter III) to the compliance audit observations pertaining to the Vizhinjam International Deepwater Multipurpose Seaport Project.

The audit objectives were twofold:

- i. to assess whether the tendering process was competitive, equitable, fair, and transparent; a
- ii. to assess whether the key clauses of the concession agreement were drawn up in such a way as to allocate risks and benefits between the Concessionaire and GoK in a balanced manner.

On reading of the above CAG Report, one gets the strong impression that the pressure on the then UDF Government to get a bidder for the Port – by hook or crook – was also taken full advantage by APSEZL, who was the only bidder for the project on the last day of the bid – 24 April 2015.

The CAG delves into many aspects of the tendering process and the concession agreement (CA)⁹. Not all the observations merit careful attention because they are also based on various assumptions and sources, which in themselves may not be fully reliable. So we will not get into all the issues examined by the CAG.

However, there are a few very substantive provisions in the CA which cannot be easily rejected, and which point to major lapses in procedure and award of benefits. The CAG investigates these issues. These issues border on a thin line between what is legal and what tantamount to be an undue favour to Adani Ports. We will discuss them.

- a) Post-bid Project Structure Modification: Substantial modifications were made to the project structure after the bidding process was completed in order to make the project more attractive to the bidders. The changes made were major and very lucrative for prospective bidders. Changes were made to: the model of the project development; the concession period increased; the total project costs enhanced; the funded cost was enhanced; thirty percent of the land of the project could be used for commercial purposes; the land could be mortgaged to raise funds to finance the projects; the earlier stated required built capacity of the port was reduced for the Phase 1. All these changes implied additional costs to the Government and were made to ensure that a firm bid would be received.
- b) Enhancement of Funded Costs: The funded costs are costs paid for by the Government. In this case, after the pre-bid process was completed, at the pressure from the bidding parties, the funded cost was enhanced from Rs.1210 crores to 1463 crores stating that this will result in a reduction in the grant (VGF) requested by the bidders. However, nothing to this effect materialized. Adani Ports insisted on a VGF of 40 percent (the maximum permitted) and got it sanctioned. How and why this was permitted despite increase in the funded works amount warrants examination.
- c) Permission to mortgage assets: The permission to mortgage the land assigned for the port estate to raise finances for the concessionaire. Government states that this was permitted to make lending secure for the lenders. However, this action also made the project more attractive for reasons other than the main objective of running a successful transshipment port. This provision is clearly against the interest of the Government and an undue favour to the Adani Ports.
- d) Sub-Lease Clause Period not being Co-terminus with Concession Period: Assets under the project can be sub-leased by the concessionaire. However, giving a provision for allowing the sub-lease period to go beyond the main project concession period is an undue favour

⁹ In essence, a concession is a license awarded by the government authorities to a private entity for execution and implementation of public service and for this purpose grant some rights for a limited period which are exclusively held by the government under law. In turn of granting such rights, the government transfers certain operating risks to the private entity.

to the Adani Ports. This is also a clear violation of commercial practices and clearly against the interest of the Government who should take possession of the land and assets after the main concession period is over.

- e) Termination Payment at end of Concession: Termination costs being paid when the project is forced to end or the Concessionaire terminated pre-maturely, is a normal practice. However, the provision for a termination payment at the end of the project concession period is a very unusual practice. What is envisaged in the Agreement is an amount equal to 30 times the realization fee on the last month of the 40th year. This is clearly a substantial amount and undue favour to Adani Ports.
- f) Adjustment of Concession Period According to Traffic: The project estimate is that port utilization target will be about 60 percent of the 0.6 lakh TEU/annum. However, if the average traffic is more or less than 5 percent of the target, within 20 years of commercial operation date (COD), then the concession period can be increased (in case of shortfall) and reduced (in case of excess). For every 2 percent shortfall in traffic, the concession period will increase by 1 year, subject to max of 10 years. And 2 percent excess traffic, means reduction of concession period by half year subject to max of 3 years. The Department of Economic Affairs (DEA) of GoI had pointed out that the 2 percent indicated was too small a trigger for traffic adjustment and a 10 percent was more appropriate. However, this trigger indicator (2 percent) was not altered. This is indeed a strange agreement because irrespective of whether the port fails or succeeds the concessionaire Adani is benefitted.
- g) Additional Concession in Case of New Ports in Vicinity: There is a clause in the Agreement which says that if a 'government instrumentality' (not defined) sets up a port within 100 km of the Vizhinjam port, then the concessionaire can get additional concession period of 3 times between COD and Appointed Date (AD) which is December 2015. This condition was NOT to apply ONLY in the impossible scenario of the port functioning at 90 percent in excess of its capacity of 0.6 TEU in any year! So suppose a port becomes operation anywhere in Kanyakumari, then if the COD of Vizhinjam is 2024 (as mentioned by GoK recently) and AD was 2015. Then the additional period is $3 \times 9 = 27$ years. Given the Gol Sagar Mala scheme this is imminently possible.
- h) Appointment of Safety Consultant: One of the important requirements in the Agreement was for appointment of a safety consultant for the Port withing 90 days of commencement (Dec 2015) However, though GoK assured in 2016 that it would be done, even in 2019 this did not happen. The current situation needs to be verified.

From the above, it should be abundantly clear to any reader that the Concession Agreement is tilted extremely in favour of Adani Ports.

The Justice Ramachandran Commission

The LDF government tabled the CAG report in the Assembly in 2017 and constituted the Justice Ramachandran Commission (JRC) in July 2017 to inquire into possible misdeeds committed by the VISL as recorded in the CAG Report. The JRC started function from October 2017.

The JRC, in its final report submitted in 2019, concurred with several of the observations of the CAG report and stated that prudence should have persuaded the UDF Government to cancel the tender on 20th February 2015 when there were no bidders on the last day and they should have proceeded to advertise the newly devised project with all details and selection should have been made in such a competitive bid. However the JRC did not delve deep into any of the alleged corruption issues, and strangely, wound up the proceeding even while a revised terms of reference was being prepared. (Ameerudheen, 2018)

Finally, when the JRC visited the port site in late 2018, they also noticed hardly any progress in the construction of the breakwater which is the most important structure in the project. The JRC concludes by stating that unless the Government actively renders support and assistance to the Concessionaire the project will not be accomplished within the scheduled time. The JRC urged the VISL to closely monitor the progress and ensure that the project is executed in time and according to the schedule and in keeping with the terms of the agreement.

The Fishers Struggles

Between 2017 and 2021, at the beaches north of the construction site, erosion increased and houses were swallowed by the sea almost in tandem to the perpendicular breakwater construction at Vizhinjam. The contribution of climate change impacts and extreme sea event only added to the misery. As many as 289 families were settled in rehab sheds with minimal facilities. The Covid restrictions on 2020-21 inhibited any form collective protest about their conditions.

The situation in the rehab camps became intolerable in early 2022, forcing the civil society groups, trade unions, and finally the church to take up adversarial action on behalf of the fishing community who were its members¹⁰. In July 2022, a wider based 'Janakeeya Samara Samiti' was formed and they set up a 'samara pandal' at the gates of the VISL in Vizhinjam demanding stoppage of the port construction until their demands for permanent rehabilitation and compensation was addressed. The destruction caused by erosion was associated to be directly and causally related to the unscientific port breakwater construction. **(See Chapter 8 of this Report)**

¹⁰ In May 2022, after Covid-19 restrictions were lifted, the Kerala Swatantra Malsya Thozhilali Federation (KSMTF) started an agitation to highlight the plight of the "coastal refugees" living in the cement godowns which were located near the Trivandrum International Airport. The 'samara pandal' was located opposite the gate of the airport which was also controlled by the Adani Group.



Fig 4.1: Fishworkers struggle against the Port

Credit: New Indian Express

The struggle attracted national attention. It was highlighted as a clear example of ‘development refugees’ created during questionable and unviable infrastructure investments. The protesters accused the state of favouring the concessionaire -- AVPPL -- the sole bidder, and for making unusually large financial commitments, including land deals favouring them. All this was based on highly suspect cost-benefit calculations which did not adequately factor the socio-ecological consequences of the investment. Several reputed policy makers and coastal and environment scientists supported the arguments being forwarded. Basically the questions being raised pertained to the AVPPL’s and the VISL’s ‘social licence to operate’ **(See Chapter 12 of this Report for an elaboration of this concept)**

The 140-day struggle, saw several strange alliances among those who opposed the struggle – including the left-oriented CPM and the right-oriented BJP coming together. They joined hands in questioning the motivations of the protesters and accusing them of being under the influence of foreign powers which wanted to prevent development in Kerala. Finally, court orders, a skirmish and rather violent police action brought the agitation to an end.

The Government conceded to all the demands except stoppage of the port construction

The protesters’ other demands, on which the government reportedly took a favourable position, included a temporary, free and accessible residential facility for those whose homes were lost to coastal erosion; compensation for these losses and adequate rehabilitation; a subsidy for kerosene; ensuring minimum wages for fisherfolk on days when they are unable to take their boats for fishing owing to bad weather; rectification of damages in certain specific seaside regions

to make them available for fishing; rehabilitation for families that may be affected due to coastal erosion¹¹.



Fig 4.2: Women protesting container vessels Credit: Anuja Singh

An Expert Committee, headed by Shri. M.D Kudale, a reputed coastal engineer, was constituted by Government Order, on 6th October 2022, to study the erosion issue. The Janakiya Samara Samiti demanded representation on this Committee, but this was disregarded.

The ToR of the Expert Committee was: ***“to examine whether there has been any such coastal erosion consequent to the work done for constructing the port at Vizhinjam and to identify specific measures to address the coastal erosion if any, observed in the zone of influence of construction.”***

The Committee was instructed to ***“hear the views of the representatives of the local population before finalising the report.”***

As of November 2023, there was no consultation with the local population and the report of the Committee is yet to be released.

¹¹ Ultimately, these demands were also only very minimally implemented.

In Conclusion

The VISL has been plagued with a series of concerns and controversies from its inception. These worries primarily revolve around the process by which the project was awarded to the Adani Group and the subsequent modifications to the concession agreement. The Comptroller and Auditor General (CAG) of India's audit revealed several irregularities in the agreement, leading to a strong perception that the terms were heavily skewed in favour of Adani Ports. Subsequent investigations by the Justice Ramachandran Commission (JRC) validated many of these concerns, emphasizing the need for greater prudence in handling the tender process.

The project has also faced resistance from the fishing community and civil society due to issues of coastal erosion and inadequate rehabilitation efforts. The protests, which gained national attention, raised questions about the project's social and ecological consequences and the government's commitment to the welfare of its citizens. Despite some demands of the fishers being partially met, the construction of the port continued, leading to further tensions.

As of November 2023, an Expert Committee, headed by Shri Kudale, appointed by the Government, is yet to submit its report. It remains to be seen how the committee's findings will be received and whether they will address the concerns raised by the affected communities.

The VISL project continues to be a source of contention and debate, underscoring the challenges of balancing economic development with environmental and social well-being.



5. Beach and coastal ecosystem

..... The decision to build a coastal structure should be based on a thorough analysis of the shoreline developments in the past and estimated developments in the future. The physical processes causing erosion should be properly identified, otherwise, erroneous decisions may be taken.....

M.D. Kudale 2015: Shoreline Response to Coastal Structures,
Aquatic Procedia 4 (2015) 333 – 340

Thiruvananthapuram District, with a 78-kilometre coastline, which is part of the lower south-west coast of India has its characteristic geomorphology. The coast has sandy beaches, headlands and cliffs, pocket beaches, and artificial structures like rock walls (seawall), fishing harbours and promenades. This is a high energy coast characterised by monsoon high waves, steep beach face and medium-sized beach sand. Waves are generally from west and west south-west during rough monsoon season and from south-west during fair weather season. Tides are micro tidal.

In this Chapter we discuss two aspects of the impact of the VISL port construction.

The first and most contentious is about the coastal processes and the issue of erosion and accretion of the beaches of Thiruvananthapuram towards the north and south of the port site.

The second deals briefly with the loss of aesthetics of this area which has been designated as one of outstanding natural beauty.

Coastal processes and coastal erosion

Characteristic features of coastal dynamics of Thiruvananthapuram coast

One of the distinct features about the wave climate of Thiruvananthapuram coast is the occurrence of remotely forced long period swells that originate from southern Indian Ocean. These remotely forced waves have been named as *Kallakkadal* (Kurian, et.al. 2008) indicating its occurrence during fair season when calm conditions are expected. Wave height could be more than 3 m and periods could go up 20s. These could cause large nearshore wave setup and enhance the sea level due to its nature of high groupiness (Thomas et.at. 1986; See Fig.5.1a and 5.1b).

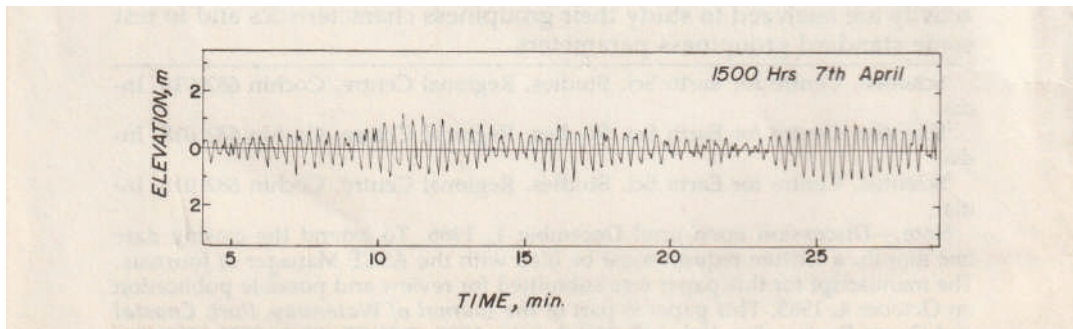


Fig.5.1 a. Wave record on 7th April 1982 showing highly grouped waves due to remotely forced long period swell waves (extracted from Thomas et.al. 1986)

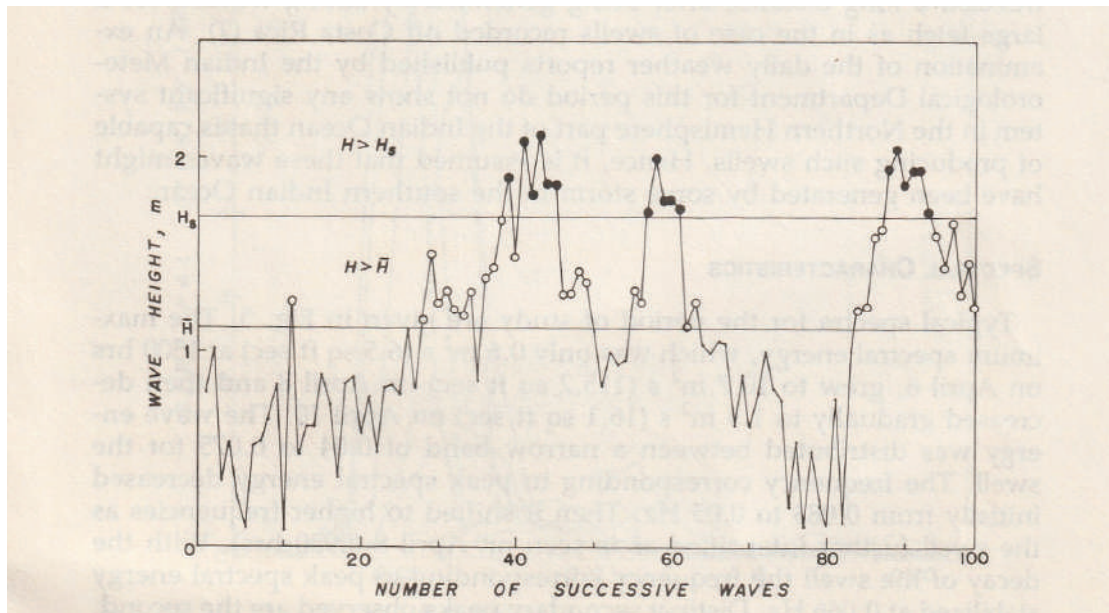


Fig.5.1 b. Significant wave height (H_s) plot showing group of waves higher than H_s followed by shorter waves of height less than H_s (extracted from Thomas et.al. 1986). This is more prominent for average wave height.

Sediment transport is northerly except during south west monsoon when it is southerly. Net sediment is northerly and is about 75,000 to 1,00,000 m³ per year. Thiruvananthapuram coast has closure depth (depth of active sediment transport) of about 13m (Fig.5.2) which was computed for west coast (Kurian et.al. 2020) and higher values have been computed by for Thiruvananthapuram coast (Sheela Nair (personal communication)).

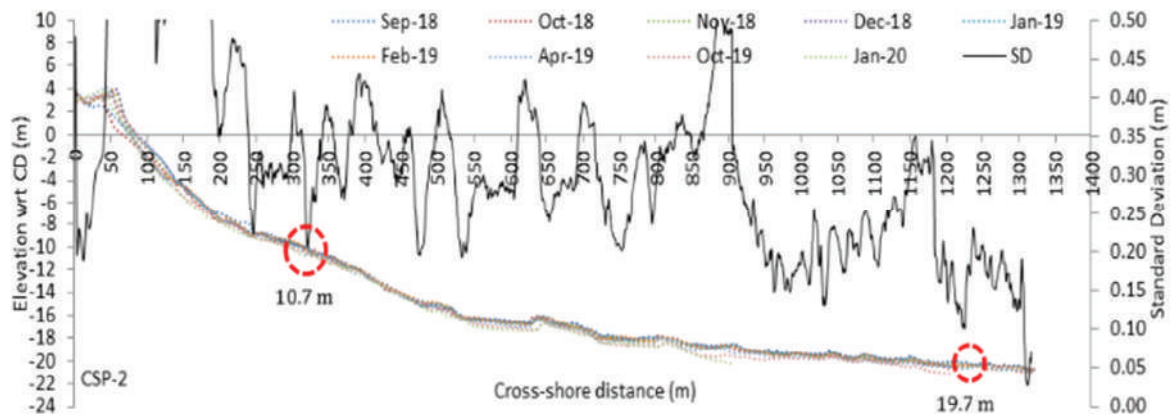


Fig. 5.2. Inner and outer closure depth of 10.7 m and 19.7 m respectively south of VSL computed for a coast south of Vizhinjam (Sheela Nair, personal communication)

The beaches south of headlands/promontories and breakwaters are stable or accreting due to net northerly longshore sediment transport, while erosion tendency is observed on the north side when its equilibrium is affected by any interventions (Fig. 5.3 & 5.4). Lateritic cliffs, fronting the sea or with seasonal beach, as in the case of Varkala and Vizhinjam (Neelima et.al. 2017), undergo slumping and cliff edge retreat, as episodic events (Fig 5.5). Spits adjoining tidal inlets are prone to shoreline variations due to oscillations of the inlet mouth

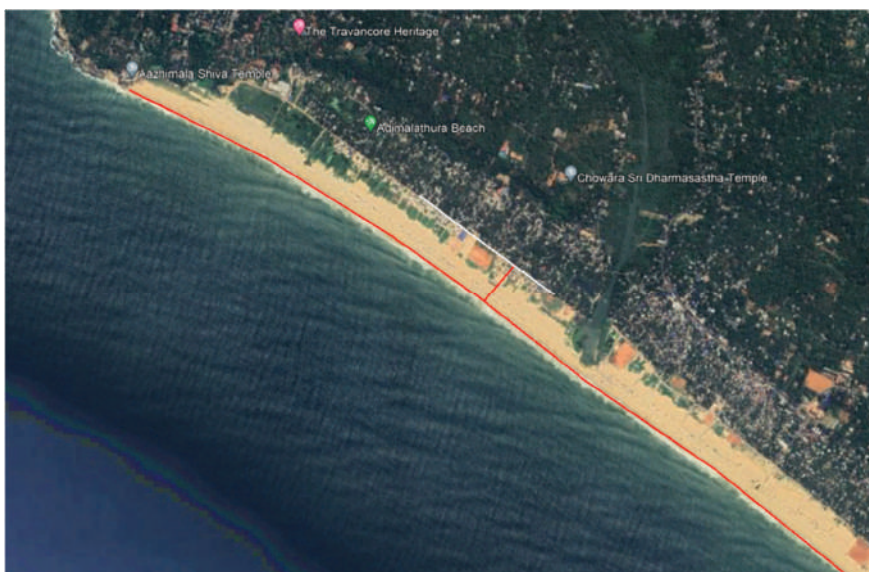


Fig. 5.3. Accreted very wide beach south of Azhimala headland indicating northerly net sediment transport



Fig. 5.4. Beach formation and erosion respectively on the south and north sides of harbour breakwaters at Muthalapozhi



Fig. 5.5. Eroding cliffs south of Vizhinjam Fishing harbour almost at the VSL site (Credit: Neelima 2017)

It has been observed along this coast that interventions in the form of inlet stabilization, construction of fishing harbours and construction of coastal protection structures trigger erosion along adjoining coasts. Seawalls constructed along the highly eroding coasts of the district get damaged quite often well before the expected life span. Fishing gaps within seawalls are areas of severe temporary erosion during rough monsoon season. Thiruvananthapuram coast has been

highly vulnerable to coastal erosion, especially during southwest monsoon, which has been continuously getting extended to new coastal stretches since 1980s' mainly due to interventions through coastal structures (Kankara et.al. 2018, NCCR 2020, NCSCM 2013, Noujas 2015, Neelima et.al. 2017). Sea level rise and extreme weather events like cyclones due to climate change have added to this vulnerability.

Thiruvananthapuram coast had luxurious sandy beaches all along the coast except the Vizhinjam-Kovalam headland area and Vakala cliff area till the 1980s' (Baba, 1979; Thomas, 1986; Machado, 1995; CESS 1988).

Seasonal erosion during the southwest monsoon (rough season) was the main mode of coastal erosion during those periods. The annual erosional cycle of Thiruvananthapuram coast is as follows: An eroded beach reforms during the post monsoon (fair season) to form a wide (normally as wide and as high as the previous year) fair season beach and the cycle repeats every year (Fig. 5.6).

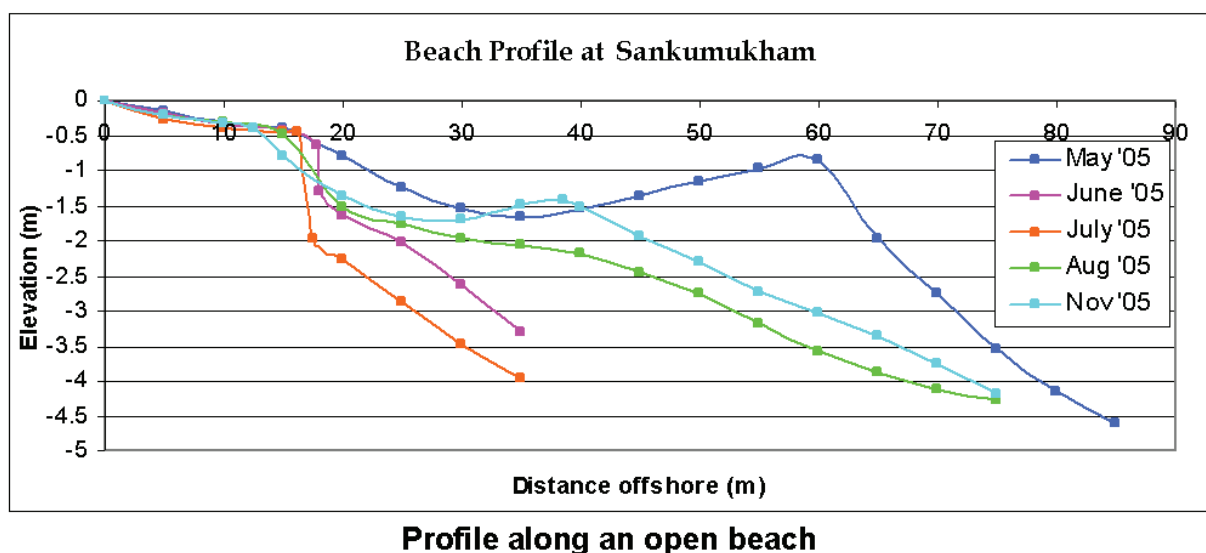


Fig.5.6. Recovery process of fair season beach (here the beach profile in May) after monsoonal erosion in June-July: 2/3rd of beach is recovered by next Aug - Nov itself

This phenomenon had been like a well-coordinated symphony of nature. The annual erosion cycle starts with the on-set of south west monsoon (June) with arrival of short period high monsoonal waves. This wave force starts eroding the beach by scooping the well-developed fair weather beach berms. The sediment thus eroded moves with the wave backwash and settles at a point where the incoming monsoonal waves neutralizes the backwash force. At this point, a shore parallel sand bar will form. This sand bar acts like a submerged reef. The incoming monsoon waves primarily breaks over this sand bar hence some authors call it "break point bar." Between this break point bar and the monsoonal beach, a shallow trough is formed. After breaking on the sandbar the monsoonal waves propagate through this trough and secondarily breaks and surges

on the beach face. This process continues all through the monsoon season. With the cessation of monsoon, the fair-weather long period waves of lesser height arrive (August-September). These long period post monsoon waves tend to shovel the sediment shoreward. Hence the shore parallel break point bar built by the monsoonal waves is demolished and shovelled shoreward to weld with the beach thus the beach width increases during post monsoon season. Re-formation of the beach almost to the pre-monsoon level happens by November-December. This whole process is described in more detail in Thomas and Baba (1986).

Upsetting the normal coastal process

The currently observed high vulnerability of the northern Thiruvananthapuram coastal tract has developed over a period and is closely correlated to the built structures which have been constructed over the years. Numerous human interventions already exist along the 78 km Thiruvananthapuram coast which include 2 fishing harbours at Vizhinjam and Muthalapozhi; seawalls for about 26 km; groynes numbering about 55; and promenades for a length of about 1 km. All these interventions have changed the geomorphology of the coast drastically and caused severe erosion during monsoon time along different stretches of the coast for about 35 km (Fig. 5.7)



Fig. 5.7. Kovalam - Once there was a very wide beach seaward of the building (even during monsoon season) which was built (in 1984) landward of the monsoonal berm crest – best example of what happens with interventions on beach processes (Credit: K V Thomas)

The seawall coasts without beaches have brought one more dimension to the monsoonal erosion. It is the overtopping of waves over the seawalls causing flooding and damages to

dwelling units and other properties (Fig. 5.8). Overtopping occurs during fair season also when remotely forced long period swells (*kallakkadal*) occur. Shoreline would not change where seawalls are present when shoreline is held at the same place through reinforcement, repair and reconstruction, but damages due to slumping seawalls and overtopping waves do occur. The result is increasing the height and size of seawall to overcome overtopping and cutting the community from the coastal system. This process continues and high seawalls of about 2 m from ground becomes a common feature (Fig. 5.9a & 5.9b).



Fig. 5.8. Overtopping waves causing damages to houses – these houses were away from the shoreline, but came close to shoreline when beaches got eroded after seawall construction.



Fig. 5.9a. Low seawall with beach on its seaward side even during monsoon at Valiyathura (Photo: June 2007)



Fig. 5.9b. Higher seawall at Valiyathura after series of repairs and reconstructions for sustaining slumping seawall with no beach on seaward side even during fair season (Photo: fair season 2018),

Other experiences along the Kerala coast and elsewhere in the State, as well as other coastal states, points to large scale shoreline changes, including coastal erosion in the adjoining coasts, caused by built structures. This reality of erosion has been widely studied by coastal engineers and scientists (Kudale 2010, Sheela, et.al. 2011, Noujas et.al. 2014, Black et. al. 2018).

One of the largest interventions along the Thiruvananthapuram coast is the ongoing construction of VISL which includes 3.18 km long breakwater, and dredging between 15 to 20 m to get a draft of 20.4 m for the inner channel, and 18.5 m for the berth and outer channel, and reclamation of coastal sea for 66 ha using dredged materials of 7.6 million m³ (Fig. 5. 10 & 5.11). **Such vast scale of reclamation of coastal waters is happening along this coast for the first time.** Maintenance dredging to the tune of 30,000 m³/year (as per DPR) will be a regular activity. About 1 km of the breakwater is towards offshore while the remaining 2.2 km is parallel to the shoreline towards south almost along the 20 m isobath.



Fig. 5.10. The site of Vizhinjam International Seaport. Breakwater of about 1 km protrudes beyond the headlands. Base map from Google Earth; Breakwater further turns south and proceeds parallel to the coast for another 2.18 km in the first phase (under construction)

These structures protrude to sea well beyond the Vizhinjam-Kovalam headland (Fig. 5.10) and will redefine the hydrodynamic and sediment dynamic system. All these activities undertaken or proposed have the potential to modify waves, currents and cause major impacts on sand dynamics.

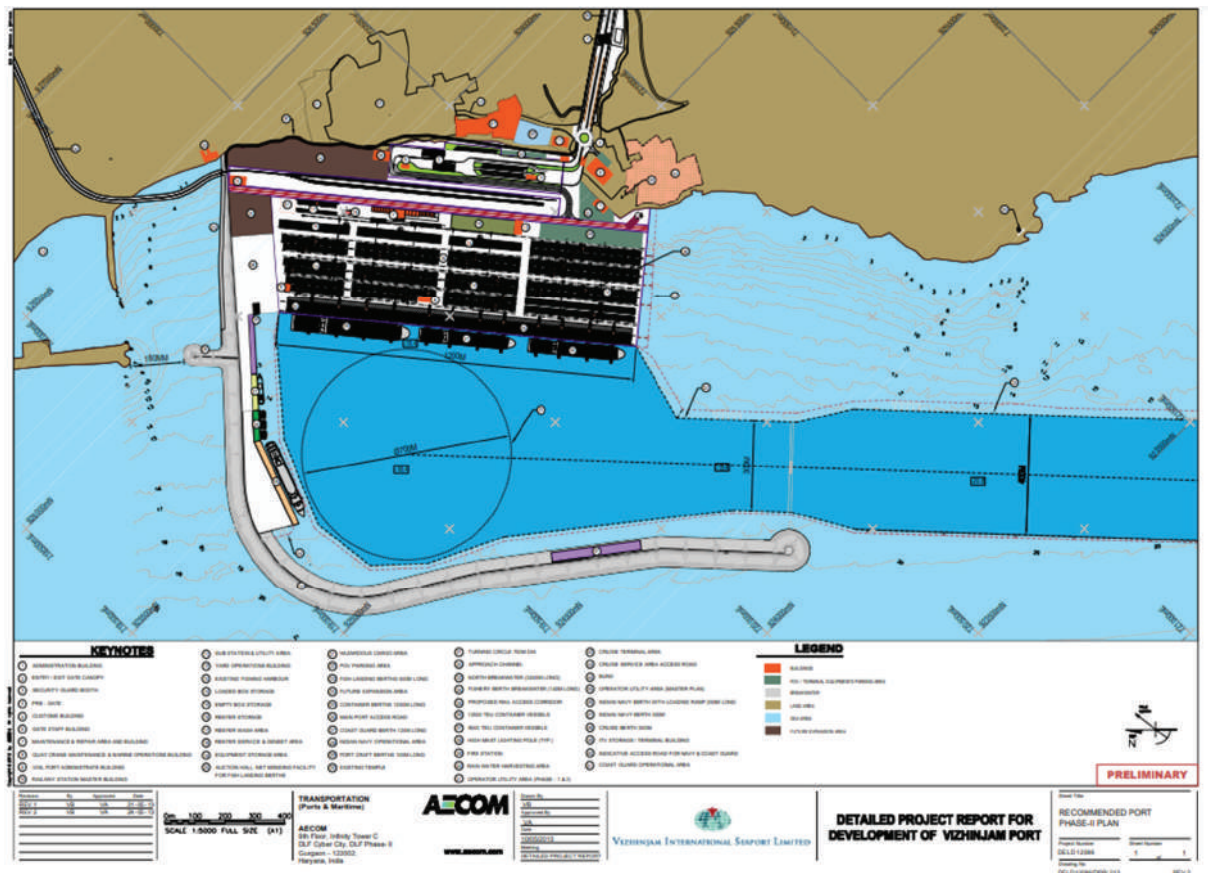


Fig.5.11. Breakwater of 3.18 km, Dredging between 15 and 20 m isobaths to the tune of 7.6 million m³ for the required draft for port basin and inner and outer channels and reclamation of 66 ha of coastal water (Source: VSL DPR)

Construction of Vizhinjam Port and impact on shoreline dynamics

The expected impacts due to Vizhinjam port construction, as documented for other similar port constructions are:

- Coastal erosion and flooding in the down-drift side
- Damages to houses and other coastal properties
- Accretion and flooding in the up-drift side
- Damages to coastal and inner shelf biodiversity
- Damages to coastal and inner shelf habitat
- Interference with fishing activity, especially traditional fishery
- Loss of job and income to fishers Impact on the social fabric of the coastal communities
- Adverse impact on coastal aesthetics

The stability of a beach-nearshore system is dependent on the sediment budget which is sustained by normal coastal processes in the sediment cell (Rosati 2005, Thunyaphun et.al. 2023). Any disturbance in the sediment budget within the sediment cell will reflect on the shore stability. The Vizhinjam port location is within the sediment cell between Muttom headland (Kanyakumari district) and Thangassery headland (Thiruvananthapuram district). Kovalam headland cannot be an effective sediment cell boundary since the closure depth here is about 13 m (Kurian et.al. 2020 and Black et.al. 2017) which is higher than the 10 m depth close to the headland. The bathymetry on either side of Kovalam headland does not show significant variations indicating the possibility of sediment exchange across Kovalam headland.

Coastal erosion is a manifestation of a deficit in sediment budget when coastal processes remove more sediment than what is added in a coastal sector. The processes that influence sediment budget are the inner shelf process, nearshore process and beach-surf zone process and the major components that facilitate sediment budget are: (i) the sand moving up/down the coast in the longshore direction; (ii) sand moving onshore-offshore (iii) sand lost to land due to overtopping (iv) sand from land sources and (v) sand lost due to mining, dredging, etc. The construction activities of Vizhinjam Seaport such as construction of breakwaters, dredging and reclamation of coastal waters, all of which takes place in the nearshore and inner-shelf are affecting the sediment pathways and sediment supply to other sectors in the sediment cell adding to the severity of monsoonal coastal erosion north of Kovalam headland.

Dredged outer channels and harbour mouth become new sinks for sand due to inner shelf sediment dynamics depriving the sediment supply to adjoining beaches. Reclamation using dredged materials of 7.6 million m³ will lock that much of sand and will not be available to sustain sediment dynamics leading to increased shoreline instability. The 7.6 million m³ of dredged sand is quite significant when compared to the total sediment transport of 4 to 6 lakh m³. Maintenance dredging to the tune of 30,000 m³ of sand per year is also very substantial along the Thiruvananthapuram coast where the net sediment transport is comparatively low with 70,000 to 1,00,000 m³/yr. towards north. For a coast where a low net sediment transport sustains the beach, a small disruption in sediment transport is enough to unsettle the stability of the coast.

Headland bypassing of sediments (George et.al. (2019), Durate et.al. (2019), etc.) is very important in sustaining the sediment budget and sediment supply on either side of Vizhinjam-Kovalam headland which is the north boundary of a sediment sub cell. The ongoing Vizhinjam seaport construction activities are removing sediments from the nearshore and blocking the natural flow of sediment in the inner shelf which reduces sediment availability, and substantially diminishes the sediment bypassing across Vizhinjam-Kovalam headland. This process has a significant role in the regional sediment budget and impacts the availability of sediment, especially down stream of VSL constructions. The result is substantial increase in the monsoonal erosion along the already highly vulnerable Panathura to Vettukad sector.

The port breakwater protrudes more than 1 km offshore, much more than the 300 m Kovalam headland. The breakwater with a total length of 3.18 km is larger than the Vizhinjam-Kovalam

headland system which will totally change the existing coastal process and affect the sediment budget completely curtailing the sediment bypassing towards north of the headland.

The influence of inner shelf dynamics on nearshore sediment transport system along the west coast of India has been well described by Black et.al. 2008, though for an open coast. This was further explained by Kurian et.al. 2009 detailing the mechanism of longshore and cross shore sediment flux. According to these studies the sediment transport along the west coast is a closed sedimentary system which has a step ladder nature (Fig. 5.12). It has an annual net northerly sediment flux in the nearshore and a net southerly flux in the inner shelf, which extends up to 2 km from the shore. These two counter directional pathways are linked by cross shore bridging transport. The type of construction activities by the VSL are in the nearshore and inner shelf and this will intervene with the sediment pathways that sustain the sediment transport. It will result in deficiency of the existing sediment supply to the coastal sectors north of Kovalam headland leading to increase in the severity of monsoonal erosion.

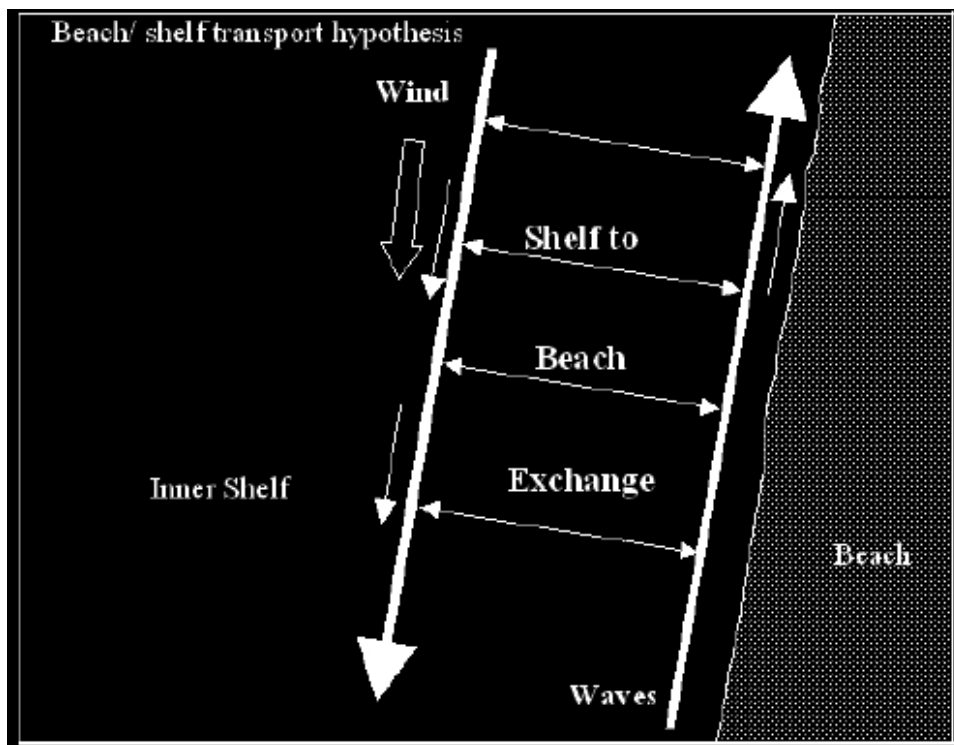


Fig.5.12. Step ladder nature of inner-shelf sediment transport (extracted from Black, et al 2008)

Sediment movement corresponding to remotely forced long period swells (*kallakkadal*) could further enhance movement of sediment in the inner shelf and support supply of sediment to the adjoining coasts. As mentioned earlier, the depth at the Kovalam-Vizhinjam headland system (about 10 m) being less than the closure depth of 13 m computed for west coast, exchange of sediment between the inner shelf of the south and north side of Kovalam-Vizhinjam headland has been happening which has an important role in sustaining the sediment budget of the region. This process of sediment exchange will be significantly curtailed with the removal of sediment

from the inner-shelf due to dredging and the blockade of sediment transport by the port breakwater. This will further increase the vulnerability of the already highly vulnerable coast north of Kovalam headland.

The recovery from monsoon induced coastal erosion is dependent on the post monsoon sediment supply (Dodet et. al. 2019, Masselink et.al. 2014). This recovery process is seriously affected with the decreased sediment supply due to changes in the sediment budget and headland bypassing because of the Vizhinjam seaport construction activities.

The cumulative impact of VSL construction activities on sediment budget and headland bypassing will significantly reduce the supply of sand and cause deficiency in the availability of sediment towards north of Vizhinjam leading to enhanced severity of monsoonal erosion, overtopping and vulnerability along Kovalam-Vettukad sector.

Box 2: Kallakkadal (Remotely forced long period swells)

Occurrence of coastal flooding in accreted beaches like Adimalathura and overtopping of waves along seawall (rock wall) coasts without beaches have been frequently observed along the Thiruvananthapuram coast even during fair season when sea is fairly calm. This was investigated by Murthy and Kurian (2006) and concluded that remotely forced long period swells that originate from Southern Indian Ocean are causing this. The occurrence of these long period swells and impacts have been reported in earlier occasions also (Thomas et.al.1986, Baba 2005). Wave height could be more than 3 m and periods could go up to 20 s (Thomas, et.al.1986, Sheela and Kurian 2012). The findings of Thomas (1986) were based on nearshore wave measurements in April 1984 from Valiyathura, Thiruvananthapuram (close to and north of Vizhinjam) and the origin of these waves was attributed to storms in southern Indian Ocean. These cause large nearshore wave setup and enhanced sea level due to its nature of high groupiness. The impact is more severe when this coincides with Perigeon Spring Tide along with increased wind speed (Krishna et. al. 2023a). With more coasts becoming rock wall coasts without beaches, the severe impact of these waves has spread to more areas causing serious damages to inhabited areas even during fair season. The impact is more visible during fair season when calm conditions are expected and the swell originates far south in the South Indian Ocean. Traditional fishers of Trivandrum had named these waves as *Kallakkadal*. Recent studies by Krishna (2023a and 2023b) have reconfirmed the occurrence of these waves in the Thiruvananthapuram coast and the resultant flash floods with more detailed studies. The occurrence of flash floods is relatively more along the Thiruvananthapuram coast (Ramesh et. al. 2022). These long period swell waves could increase the closure depth significantly modifying the sediment dynamics in the region. The importance of these waves becomes more significant since the inner shelf sediment transport of the southwest coast of India is in the form of a step-ladder where the inner shelf sediment transport is sustained by two longshore transports in the opposite directions (Black et. al. 2008 and Kurian et.al. 2009). These counter-directional transports are linked by reversing cross transports. The occurrence of long period swell waves and the step-ladder nature of inner shelf sediment transport indicate that the impact of various activities such as dredging, reclamation and construction of breakwaters on sediment transport and beach stability are going to be very severe since all these are undertaken in the inner shelf. The impact will be very serious in the case of seawall coasts with no beach or narrow beach such as Panathura to Shangumukham sector.

This unique nature of Thiruvananthapuram coast was neglected while planning and preparing DPR and EIA for VISL port.

Box 3: Closure depth at Vizhinjam

The concept of closure depth is very important for the design of coastal engineering structures. The closure depth indicates the seaward boundary of the active coastal zone and intense morpho dynamics. Recent studies for the west coast by Black et.al. 2017 and Kurian et al 2020 have computed closure depth up to 12 to 13 m for west coast. The frequent occurrence of remotely forced long period swells along the Thiruvananthapuram coast significantly increases the closure depth, thus extending the active sediment transport zone much seaward. The strong upwelling during the southwest monsoon season also pushes closure depth seaward. **Closure depth of 7 to 8 m taken for VISL port is gross under estimation.** The depth at the tip of Kovalam headland is less than 10 m which will facilitate sediment exchange across the headland. This will also facilitate substantial bypassing of sediment across the Vizhinjam-Kovalam headland. Black et.al. 2017 and Kurian et al 2020 have found that sediment is mobilised out to at least 20 m depth which has been substantiated by Sheela Nair in their recent studies (Sheela Nair, personal communication). It implies that the inner and outer channels which are 18 to 20 m will act as sediment traps significantly affecting the sediment availability in the adjacent beaches on either side causing serious impact on shore stability.

These aspects were not adequately considered in the preparation of the DPR and EIA by VISL

Box 4: Sediment cell

Coastal regions have alongshore natural boundaries like promontories and headlands, large estuaries or manmade structures like harbour breakwaters which compartmentalise the coastal system into primary sediment cells and sub cells. Sediment cell is defined as a length of coastline, which is essentially self-contained as far as the movement of sediment is concerned such that the interruption of such movement in one cell should not have a significant effect on adjacent sediment cells (Black et.al. 2018). Each sediment cell is generally considered to be a closed system. No sediment is expected to be transferred from one cell to another. However, it is unlikely that sediment cells are fully closed. With variations in waves, wind, currents, tidal currents, and geomorphology, it is inevitable that some sediment is transferred between cells or offshore. It is also expected that any intervention in any part within sediment cell can have impact on other coastal areas within the cell.

Recent studies have shown that sediment dynamics should be the effective tool for identification of sediment cells (Black et.al. 2017). It was found that sediment is mobilised out to at least 20 m depth which is much beyond the closure depth (depth within which active sediment transport takes place) of 8 m used by VISL. The step ladder type of sediment transport in the inner shelf which has been identified for the southwest coast of India also shows sediment transport beyond 8 m depth in the inner shelf (Black, et.al. 2009). Black et.al. (2017) have computed closure depths up to 13 m. Accordingly headlands greater than 2 km long has been taken as the boundaries of primary sediment cell and headlands greater than 1 km has been taken as the boundary of secondary sediment cell while preparing the Shoreline Management Plan for Maharashtra and Karnataka coasts.

As per NCSCM (2013) the southwest coast of India which includes the Vizhinjam coast is part of the primary sediment cell extending from Muttom headland in Kanyakumari district to Thangassery headland

in Kollam district. This is further divided into secondary sediment cells extending from Muttom to Kovalam and Kovalam to Thangassery. Vizhinjam coast is within the secondary sediment cell extending from Muttom to Kovalam. This has been the basis for the argument of VISL that there could not be any impact on coasts north of Kovalam headland. This argument is invalid as shown by the recent studies for the west coast (Black et.al. 2017).

Length of the headland is less than 300 m. Depth at the tip of Kovalam headland is less than 10 m. In no way this headland can be an effective boundary of a sediment cell. It implies that Vizhinjam and adjacent coasts, both on north and south sides, are within the same sediment cell. All the activities such as construction of breakwater protruding offshore for 1 km, mining of sand from the inner shelf and reclamation of coastal waters with sand mined from inner shelf will have severe impact on coastal stretches north of Vizhinjam such as Kovalam, Panathura, Poonthura, Beemapalli, Valiyathura, Shangumukham, etc. It implies that Vizhinjam and adjacent coasts, both on north and south sides, are within the same sediment cell.

The understanding of the sediment cell is not properly addressed in the EIA and subsequent shoreline change studies for the VISL port

The breakwaters will also cause deposition of sand (accretion) and trap sand south of the breakwater which will increase the width of the coast. Normal swash-backwash phenomenon that keeps the beach healthy will be curtailed which may cause flooding in the accreted coastal areas like Adimalathura and towards the south of the VISL port in combination with the blocking of Karichal *thodu* (canal) mouth with accreted beach sand.

Activities during construction stage such as dredging and breakwater construction will keep large quantity of sediment in suspension which could be transported beyond Kovalam headland towards north and replenish the beaches there. But this is a temporary phenomenon giving a respite for the time being.

Misconception about beach processes

There is a misconception among people who visit beaches of Kerala occasionally at different times of the year. When they visit during the November – March period (fair-weather), they witness a wide beach and carry this picture in their mind's eye. If they happen to visit the same beach during monsoon May – July period they are surprized to see a much shorter beach with the sea seemingly a few feet below them. This variation in width and height, is the result of a natural symphony of nature -- because the beach is the result of the interface action between the sea and the sandy shore. Beaches, unlike land, are by their very nature, fuzzy and dynamic. They are never stable.

In fact, the volume of beach sands today -- their width and height – both during the fair-weather and monsoon season, particularly on the beaches of Thiruvananthapuram City, are **much less** than what it has been prior to the commencement of the Vizhinjam port construction.

This is most evident at Shankhumgham and Valiyathura. The decrease in beach sand volume and the loss of height and width of the fair-weather beach will significantly increase the impact of monsoon erosion. This is clear by the increased damages to houses and properties every year since 2016 (**See Chapter 8**).

For example, the extensive and wide beach which existed at Shankhumgham is evidenced by the massive crowd assembled in Shankhumgham beach when the Nava Kerala March ended at Shankhumgham in February 2016 (Fig 5.13) (the port construction just commenced in December 2015).



Fig. 5.13. Very wide fair-weather beach of about 75-80 m at Shankhumgham (when the port construction commenced) which could accommodate massive crowd for the Finale of Nava Kerala March in Feb 2016

However, by November 2022 even the fair-weather beach at Shangumukham had drastically reduced to a width of about 30-40 metres (Fig 5.14)



Fig. 5.14. Fair weather beach at Shankhumgham in Nov 2022 when the beach width is 35-40 m and the maximum width it could attain is 50 – 55 m – a drastic reduction from fair weather beach of 75-80 m when the port construction commenced. (from Indian Express)

The same process of excessive erosion became evident at the Valiyathura pier just south of Shangumukham. Prior to the commencement of the port construction the beach extended into the sea to almost three-quarter of the length of the pier (Fig 5.15)



Fig. 5.15. Wide beach and the pier at Valiyathura prior to commencement of port construction

However, by November 2022, the wide beach gradually got reduced and even during this fair-weather season, the pier itself got damaged and became unfit for use. (Fig 5.16)



Fig. 5.16. Wide beach gradually got reduced as is seen in Nov 2022 and the Valiyathura pier itself got damaged and became unusable – fair weather beach totally disappeared south of pier while the width of fair-weather beach considerably reduced north of pier

Cumulative impact of all the above activities is to significantly increase the vulnerability of the already highly vulnerable coast on the north side of VISL. Overtopping of waves and flooding during monsoon will increase along the seawall coasts which are already devoid of beach. Coasts with beaches will gradually lose beaches and become more vulnerable to monsoon waves.

Studies indicating shoreline changes and coastal erosion after commencement of VSL construction

Many of the available studies on sediment dynamics and shoreline changes along the Thiruvananthapuram coast have found that many coastal sectors close to Vizhinjam such as Panathura, Poonthura, Beemapalli, Valiyathura, Shankhumgham (north of Vizhinjam), Kollamcode and Paruthiyur (south of Vizhinjam) which were affected by erosion in the past (Kanakara et.al. 2018, NCCR 2020, NCSCM 2013, Neelima et.al. 2017) have experienced increase in erosion, especially monsoonal erosion, after the construction of the port has commenced. Neelima (2017) has shown that even the coastal sector where the VSL is located has been an eroding coast (Fig. 5.17).



Fig. 5.17. Eroding cliffs (photo of 2013) south of Vizhinjam Fishing harbour and close to the VIS site – Still the EIA claimed Vizhinjam and adjoining coasts as stable (Photo of 2013; Credit: Cyriac Kodoth)

The study conducted by the JPS has shown a significant increase in the loss of houses, loss of beaches and overtopping causing damages to houses and other properties which have increased significantly after the construction of the port was initiated. **(See Chapter 8 of this Report below for details)**

A recent study by Rafeeqe and Thomas (2022) has detailed the impact of coastal structures along the Thiruvananthapuram coast. The above referred paper gives the variations in fair season shoreline and High-Water Line along the Valiyathura sector during different years from 2003 to 2021 (Fig.5.18). The retreat of fair season shoreline between 2016 and 2021 (when the port construction is underway) is substantially higher than the retreat between 2003 and 2016. By 2021 the beach is almost fully lost. This also points to the impact of the ongoing construction activities of VISL port.

Another study by Shaji et.al. 2022 also shows that the coast north of Vizhinjam, especially the Panathura-Veli stretch is undergoing severe erosion since 2016.

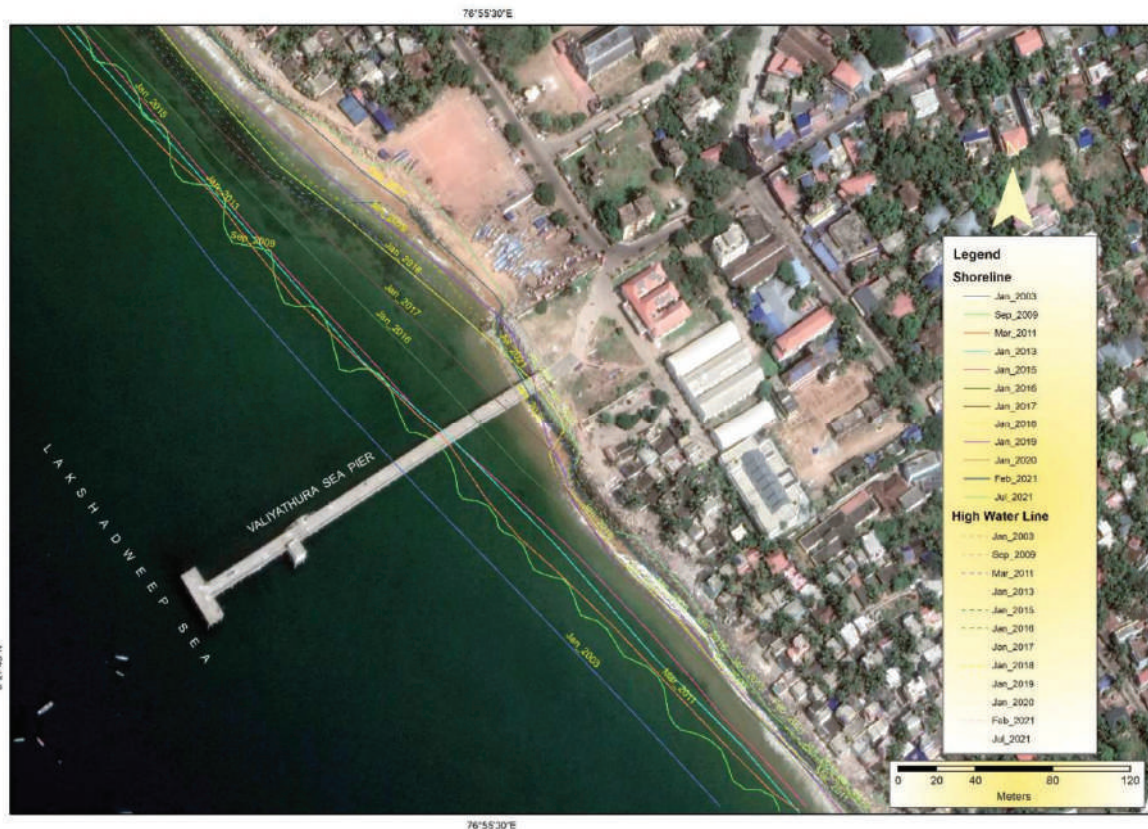


Fig. 5.18. Substantial retreat of shoreline at Valiyathura after 2015 (after the port breakwater construction started): Extracted from Rafeeqe and Thomas (2022)

Box 5: Kudale on Ports and Coastal Erosion

Shri. M.D. Kudale chairs the Government of Kerala appointed Expert Committee on 06.10.2022 to “*examine whether there has been any such coastal erosion consequent to the work done for constructing the port at Vizhinjam and to identify specific measures to address the coastal erosion if any, observed in the zone of influence of construction*”

Shri M.D Kudale, who is a reputed coastal engineer, has over the years studied the impacts of ports on coastlines and suggested many ways for protection. The JPS gives below some important extracts from three of his research studies written before the commencement of the VISL port construction

1. Indian Journal of Geo-Marine Sciences Vol. 39(4), December 2010, pp. 597-604

Impact of port development on the coastline and the need for protection

Coastal areas are varied in physical features. The coastline shows constantly varying nature due to tidal effects and seasonal changes in wave and wind climate. Occasional cyclones in the region also have influence on the overall morphology. It is necessary to understand the coastal processes and predict likely effects before undertaking any coastal project. Developments of major/minor ports and fishery harbours consist of the construction of coastal structures like breakwaters, jetties, groynes and reclamation bunds. Developments of the ports also involve the dredging and disposal activities to maintain the required depths for navigation. These coastal structures and the dredging activities interfere in the coastal processes of the region. Modifications in the coastal processes have large impact on the coastline. Major morphological impact is felt in the coastal region having high rate of longshore littoral drift. Accumulation of sediments on the updrift side and erosion of the downdrift side is inevitable in these regions. Sand bypassing is one of the best solutions to mitigate this problem. Sand bypassing should form an integral part of any port development project at the planning stage.

2. Aquatic Procedia 4 (2015) 333 – 340

Shoreline Response to Coastal Structures

..... The decision to build a coastal structure should be based on a thorough analysis of the shoreline developments in the past and estimated developments in the future. The physical processes causing erosion should be properly identified, otherwise erroneous decisions may be taken.....With detached breakwaters it was seen that coastline is subjected to less erosion as compared to the groins because detached breakwater does not block the littoral drift completely and allows passage of some drift material. Therefore, detached breakwaters used in combination with beach nourishment offer a better and environmentally suitable solution to combat coastal erosion problems.

3. Procedia Engineering 116 (2015) 320 – 325 p 1877-7058

Design of Fishing Harbour Layout in High Littoral Drift Zone

Estimation of littoral drift and direction of net drift are needed for design of harbour projects. In the present study, the mathematical models were applied for design of a layout for fishing harbour, on the West Coast of India in Kerala State.

Different alternatives of the harbour layout were tested in order to reduce siltation in the harbour and to achieve the desired tranquillity in the harbour basin. In the first alternative, the southern breakwater was extended by 340 m. However, it was observed that after two to three years, the shoreline will advance and the drift will start entering the harbour basin. Therefore, in the second alternative, the mouth of the harbour was further taken into deeper water to minimize the drift entering in the harbour. With this alternative the wave tranquillity studies showed that the layout is adequate to provide desired tranquillity in the harbour basin and the wave heights will remain within 0.3 m almost round the year.

The most revealing information on shoreline changes are available from the reports of monitoring studies conducted by VISL as directed by the NGT and EC conditions (NIOT, 2018 to 2022).

These reports have discussed shoreline changes along the coastal sectors 20 km on either side of Vizhinjam (Fig.5.19). The Annual report 2018 by NIOT says that all sectors such as Vizhinjam, south of Vizhinjam and north of Vizhinjam are highly eroding during 2000-05, 2010-15 and 2015-18. All the sectors are highly eroding during 2017-18. The annual variation of the total beach volume indicates erosion during the year 2017 and 2018 along the 40 km stretch. The inter-annual scenario from 2015 - 2018 (months and year in concurrence with the satellite image analysis) indicates similar trend of more erosion and less accretion pattern along 40 km stretch, especially for the years 2015-2016, 2017-2018.

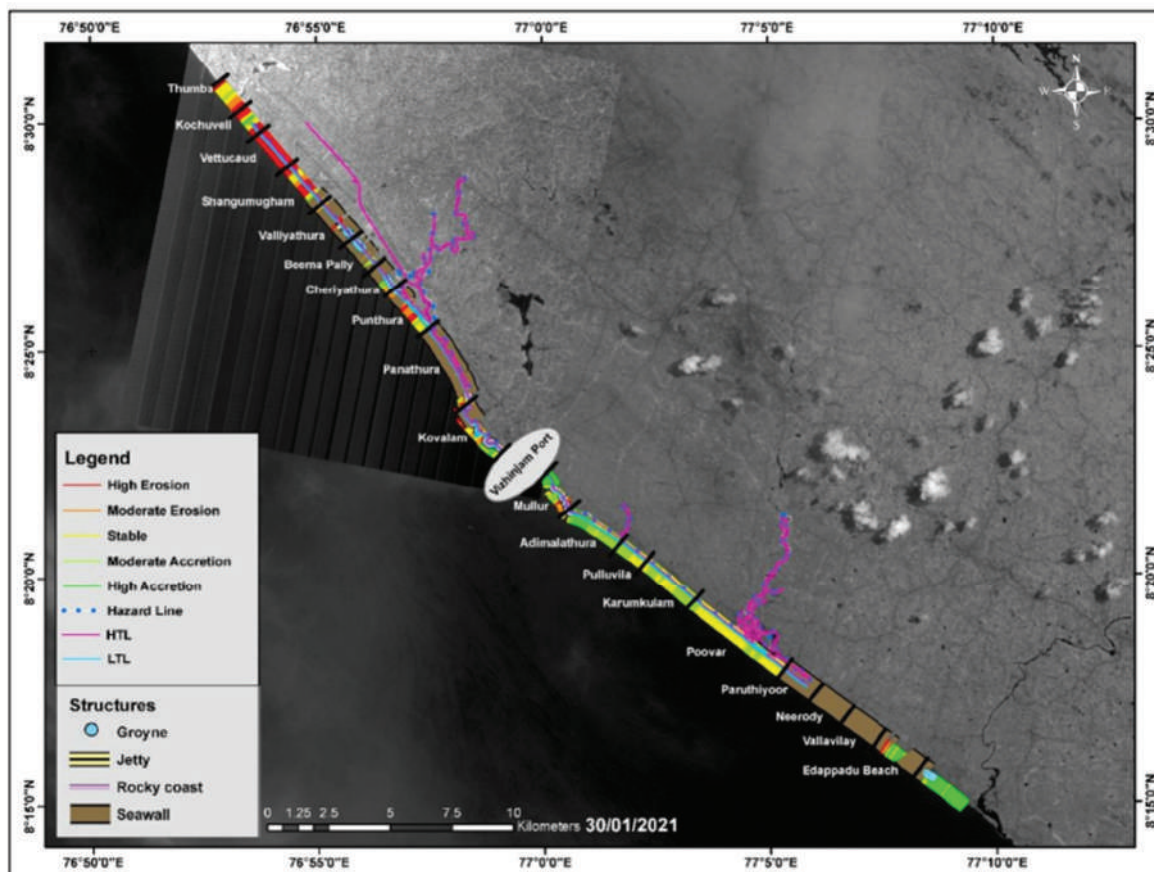


Fig. 5.19. Shoreline changes since VSL construction activities got started in 2015 – extracted from NIOT report.

The reasons for the above-mentioned erosion have not been described in these NIOT reports.

However, the report suggests that the entire coastal stretch faced erosion during the natural calamities such as Ockhi cyclone (November 2017) and high wave activities. But the information

gathered by the JPS during public consultation and questionnaire survey points to the facts **that loss of life and damages to fishing crafts during the Ockhi cyclone were mostly reported from the offshore where fishers were fishing due to lack of proper warning.** Damages to the coast due to Ockhi were minimum compared to normal monsoon rough season.

The Annual Report 2019 gives the shoreline and beach volume changes during the period from October 2018 to September 2019. The study indicates accretion at few transects of Cheriyaathura and Mullur, stable beach at Panathura and Adimalathura.

However, erosion is noticed at Kochuveli, Shangumukham, Valiyathura, Poonthura (north of Vizhinjam), Pulluvila to Edapadu beach (south of Vizhinjam). **High erosion is reported even during the fair season (Dec 2018 to March 2019) in almost all sectors on either side of Vizhinjam.** The presence of coastal protection structures like seawalls could be the reason for reporting stable/accreting coasts north of Kovalam. The absence of beach, overtopping of waves over seawalls causing flooding and damages, and damages to houses even in locations with seawalls are not reflected in this report. This study does not give any reason for the observed shoreline changes and coastal erosion.

Similar observations are there in the reports for 2019-20, 2020-21 and 2021-22. The report of 2021-22 says that the erosion spots like Valiyathura, Shangumukham and Poonthura have been eroding before and after the commencement of the port (December 2015) admitting that the Environment Clearance (EC) for the VISL was probably obtained by suppressing the fact this coast is highly vulnerable to coastal erosion. The Reports also give the timeline of climatic events and port activities trying to put the reason for erosion and shoreline changes on climate events rather than the impact of port and other construction activities. No evidence to support this claim is provided other than the effort to link the timeline of climatic events to coastal erosion.

Recent communications from the Disaster Management and the Irrigation Departments reiterates the above findings. The Disaster Management Department vide Order No. 665/2022/DMD dated 03-09-2022 states that 284 families who lost their houses due to coastal erosion are allowed compensation. The letter from Irrigation Department No.A.B.10-3494/2022/RTI dated 03-12-2022 clearly says that coastal sectors from Poonthura to Veli is affected by coastal erosion reinforcing the findings of the studies referred here. Both the above communications confirm the loss of houses after the port construction commenced.

Overtopping waves, coastal flooding, and damages to coastal protections structures

One of the major concerns along the protected coasts where the beaches are lost is the overtopping waves that cause flooding and damages to dwelling units. The entire sector from Kovalam to Shangumukham and Kollankode-Pozhiyur have coastal protection measures such as seawalls, groins, and diaphragm wall. There is substantial loss of beach or reduction in the fair-weather beach width and height in all these sectors (Fig. 5.20). From Kovalam to Valiyathura no beach is present throughout the year including the fair-weather season. Beaches along the

Valiyathura-Shangumukham sector has no beaches during SW monsoon season and it is very narrow (about 10 to 40 m) during fair season which once had 60 to 80 m fair season beach.



Fig.5.20. Valiyathura – south of pier (March 2018)

Protective envelop of beach lost and overtopping of high waves is a frequent phenomenon

In many locations seawalls and other protection structures get damaged and become dysfunctional or less functional. These have been recorded in the JPS study and during the public consultations held by the JPS.

But the above impacts are not reflected in the Monitoring Reports prepared as per the directions of NGT.

The damages due to overtopping waves were on the increase since 2015 as evidenced from the JPS study. These impacts were not that severe and consistent during the monsoon months in 2022 and 2023 due to weak monsoons.

The construction activities for Vizhinjam port have reduced the supply of sediments to these coasts further enhancing the scouring on the seaward side of the protection structures. Non-supply of sediments has also diminished any chance of beach rebuilding in these sectors. Increase in the nearshore depth close to the shore protection structures due to scouring and diminished supply of sediments has resulted in high waves breaking close to the structures causing overtopping of waves over the protection structures (Sundar et al. 2006) causing severe damage to houses and other assets landward of the structures, even during fair season when coastal hazards are not expected.

This has created a new dimension to coastal erosion in this sector. It is very evident that this coast is highly vulnerable and the vulnerability has been increasing with the continuous loss of beaches and diminished supply of sediments due to the ongoing port construction.

Wrong interpretation of the status of shoreline

A possibility for misinterpretation of shoreline and coastal erosion is likely to happen when shoreline change analysis using satellite images and other remote sensing data, are undertaken over areas where the shoreline is lined by seawalls/rock walls. Therefore, inferences such as stable coast, low erosion coasts based on satellite images/remote sensing data along such a coast should be analysed with a different perspective.

Most of the coastal stretches with seawalls/rock walls along this coast are always vulnerable due to slumping seawalls, overtopping of waves, coastal flooding, and damages to houses during southwest monsoon. These seawalls are maintained through repairs and reconstruction. Most of the seawall coasts are devoid of beaches or eroding beaches and remain vulnerable, especially during the monsoon season. Overtopping of waves and damages to houses and properties are regularly happening in these coasts during monsoon months. Seawalls are sinking and getting damaged in many locations. Depth immediately seaward of these structures are increasing due to scouring enabling higher waves to break on or very close to the seawall. **These are not reflected in the analysis from images because the shoreline status will be wrongly interpreted as stable or moderately eroding since the shoreline is normally taken as the line of seawalls which will not account for the loss of beaches on the seaward side of seawalls, overtopping of waves and sinking of seawalls.** Beach profiling being done as part the monitoring study suffers from the limitation that actual depth measurements close to seawall is not carried out due to logistical reasons. Normally there is a gap from seawall to 4 m depth in these profiling measurements. Beach profile analysis lacks actual information in the surf zone. Hence scouring and overtopping of waves will not be reflected in this also.

The Monitoring reports prepared as directed by NGT suffer from this shortcoming while reporting seawall coasts as stable. Coastal sectors with seawalls at Panathura, Poonthura, Beemapalli, Valiyathura, Kochuthopu, Shangumukham are examples of such misinterpretation in the Monitoring reports.

Any study without properly assessing the loss of beach which is the most important traditional, cultural and livelihood asset of the local community will be suppressing the real losses.

The JPS study has clearly found that the coastal stretches with seawalls are affected by overtopping of waves, enhanced loss of beaches, damages to coastal protection structures and enhanced erosional problems during southwest monsoon after the port construction began. The diminished supply of sand from the southern sectors due to various construction activities for the port have increased scouring and blocked any chance of beach reformation in these seawall coasts. Loss of beach is a permanent loss for the community and the public at large.

Modification in wave and current dynamics close to fishing harbour

The fishing harbor in Vizhinjam, which was once considered a haven for fishers has become hazardous due to the ongoing construction of the port. (Figure 5.21) The initial wave tranquillity models presented in the project's Detailed Project Report (DPR) indicated that the fishing harbor would become safer with the port's construction.



Fig. 5.21. Google map showing the Vizhinjam harbour and port with wave dynamics illustrated on it.

Credit: Jisha Elizabeth

Source: Madhyamam Weekly 2019 October 21

1. Wave that is lashing from the north western direction.
2. Breakwater built for the port
3. The port project area (Mulloor beach) where the waves used to end before the port construction
4. Waves rebounding from the port's breakwater moving to the wharf in the harbour
5. Waves rebounding after hitting the wharf.
6. Waves arriving at (fish market area)

What was once a safe harbour has gradually become an unpredictable death-trap for the fishers of Vizhinjam.

The DPR and EIA did not make the effort and collect the right data to be able to predict the wave dynamics and diffraction giving due consideration for possible climate change impacts. This is a serious shortcoming of the DPR and EIA studies. Instead, the numerical modelling studies gave a wrong picture and faulty prognosis.

The changing situation, however, has been notably distinct.

The reason for this is that the wave dynamics and diffraction are changing due to the surface structures like breakwaters and dredging. There are major modifications to sediment dynamics also. Moreover, the wave transformation due to the sea bed features like bathymetric changes, refraction, shoaling, wave breaking and partial or complete wave reflections from the harbour (Fig. 5.21) boundaries are bound to increase. With the progress of the different stages of the VISL breakwater construction, the wave and current patterns are changing significantly. Large scale sedimentation is taking place close to the fishing harbour mouth as is evidenced by the substantial beach building observed at Valiya kadapuram adjoining to and between the harbour mouth and the port breakwater under construction (Fig. 5.22). This causes a decrease in depth at the mouth and inside the harbour causing wave shoaling and even breaking of waves at the mouth. The rising number of events of boats capsizing both inside the fishing harbour; on arrival from fishing and during setting out for a trip have created a sense of fear in the minds of the fishers. In July 2021, two fishers died while attempting to enter the harbour. This is for the first time in the history of this fishing harbour.



Fig 5.22: Substantial beach building observed at Valiya kadapuram adjoining to and between the harbour mouth and the port breakwater under construction Credit: Probir Banerjee

Bathymetric measurements carried out by the fisher people with the support of the harbour offices have shown that the depth at the mouth has decreased from 10 - 12 m to 5 - 6 m due to siltation both at the mouth and inside the harbour after the port construction got started. Decrease in depth has caused wave shoaling at the mouth and inside the harbour leading to increased wave height and near breaking conditions. In 2021, because of the newly constructed breakwater for the port and the increased wave height due to shawling at the mouth of the harbour and inside, 11 boats were completely damaged along with the nets. The accidents caused loss of about Rs. 67 Lakhs. Wave action has increased within the harbour and many a

times even anchored boats within the harbour got damaged. Sand is also getting trapped between the newly constructed breakwater of the Vizhinjam port and the south breakwater of Vizhinjam fishing harbour. **(See Chapter 7 of this Report)**

Climate change and coastal erosion

There is a concerted effort from the part of VISL to attribute the reasons for coastal erosion along the Kovalam – Vettukad sector to climate change induced extreme weather events and extreme waves. It is also asserted that these are normal erosion process that are usual along these coasts. The facts are different as is seen from the following analysis.

Climate induced sea level rise is happening along the Thiruvananthapuram coast as is happening in other coasts. The SLR and its impact should be uniform along a small coastal stretch of 78 km Thiruvananthapuram coast except along the headlands and cliffs. Being a beach having high berm crest and steep beach face along this coast (Thomas and Baba 1986), the impact will be comparatively less. More over the impact due to SLR should be uniform along the sandy coasts of this coast. It is a fact that extreme weather events in the form of cyclones and extreme waves are on an increase due to climate change. The major impacts of coastal erosion, overtopping of waves and damages to houses of fisher communities are mostly faced during southwest monsoon. It is also observed in the JPS study and other studies that loss of beaches has got extended to more areas since the construction of the port was initiated. If climate change is the major reason for erosion along this coast, then this would have been reflected all along the Thiruvananthapuram coast. But coastal stretches such as Marianad, Puthukurichy (north of VISL) and Poovar (south of VISL) are not affected by enhanced coastal erosion (Fig. 5.23) while the coastal stretches adjoining the Vizhinjam port such as Poonthura, Beemapalli, Valiyathura, Shangumukham are severely affected. The loss of beach and absence of beach are the distinct characteristic of these highly eroding coastal stretches while the coasts with sufficiently wide beaches continue to be stable.



Fig.5.23. Kochuveli coast during monsoon in 2021 – Wide beach with no significant beach erosion. Beach as a protection against climate change induced erosion

Impact of cyclone is limited for few days while the impact of monsoon is an extended feature for 3 months in which a series of storms occur with monsoon breaks. During storms like cyclones, part of the beach is eroded and mostly deposited as a longshore bar in the nearshore which is brought back to the coast for the reformation of the beach as the storm subsides and long period waves replace the storm waves. **The nature of monsoonal erosion which is prevalent for about 3 months is different from this.** Attributing storms/cyclones and other extreme weather events for the enhanced erosion at certain stretches in Thiruvananthapuram coast is not at all valid. As mentioned above, in the case of Ockhi cyclone most of the accidents were in the offshore where fishers were trapped and the impact on shoreline was limited.

Artificial constructions such as ports and harbours, seawalls, groins, other hard protection structures, promenades on active beaches, etc. have been identified as the major reasons for the severe erosion observed in this part of the coast by various studies. The impact of erosion is manifested during south-west monsoon months. **The influence of Vizhinjam port construction on the already critically vulnerable coastal stretches close to Vizhinjam such as Panathura, Poonthura, Beemapalli, Valiyathura, Shangumukham will be drastic. Impacts of climate change is adding to the impacts of port construction to worsen the erosion along this costal stretch.**

Coastal accretion

All the studies have shown that the coast immediately south of the Vizhinjam port is accreting and the port breakwaters will further enhance accretion along Adimalathura-Pulluvila coastal stretch. Accretion has already choked the mouth of Karichal *thodu* (stream) and is thus contributing to coastal flooding (Fig. 5.24). Karichal *thodu* mouth is dredged open few times every monsoon and other flooding events to facilitate draining of the flood water to the sea. Further accretion due to the construction of the port breakwater will make this exercise more difficult and time consuming. Once the beach gets accreted there will also be a landward sloping berm which will further contribute to coastal flooding.



Fig.5.24. Flooding at Adimalathura when remotely forced long period swells (*kallakkadal*) occur in combination with high tides/spring tide.

The breakwater being constructed for the port will cause accumulation of sand immediately south of the breakwater since the net longshore transport is towards north which is about 70,000 to 1,00,000 m³. Sand will also get deposited and trapped in dredged channels and the annual maintenance dredging as per VISL is 30,000 m³ of sand which is substantial compared to the net sediment transport. The sand getting deposited south of breakwater and that get trapped in the dredged areas comes from south. **In normal conditions this sand will get redistributed when the wave and longshore current direction changes. This will not happen due to the presence of breakwater and due to maintenance dredging resulting in a gradual decrease in sediment availability in the southern sectors like Kochuthura, Poovar, Pozhiyur.** The post monsoon beach reformation will be affected and will lead to loss of beach and coastal erosion. Erosion trend now observed in Pozhiyur, Kollamcode and Neerodi will get aggravated.

Aesthetics

The headland-cliff-pocket beach geomorphological systems along coastal stretches are normally known for their aesthetic beauty. This is true for Vizhinjam – Azhimala coastal stretch (Fig. 5.25) which harboured more than 30 beach resorts, mostly catering to high spending foreign and domestic tourists.



Fig. 5.25. Sea View from a cliff near Vizhinjam

Credit: John Kurien

This coastline is known for its stunning natural beauty and is a popular tourist destination. The aesthetics of this coastline are characterized by several key features:

Pristine Beaches: The coastline is dotted with beautiful, sandy beaches that are famous for their natural beauty. Kovalam Beach is one of the most well-known and frequently visited beaches in India. It is renowned for its crescent-shaped shoreline, clear blue waters, and golden sands. The beaches along this coastline offer a serene and picturesque setting for relaxation and water activities.

Lush Greenery: The coastline is flanked by lush palm groves and coconut trees, which add to its tropical charm. The greenery along the shore complements the blue waters and creates a stunning contrast that enhances the visual appeal of the area.

Rocky Cliffs: Kovalam-Vizhinjam-Azhimala coast is known for its rocky cliffs and the once natural harbor. These rugged cliffs add a unique and dramatic element to the coastline's aesthetics, offering excellent vantage points for panoramic views of the Arabian Sea.

Sunset Views: The Kovalam-Vizhinjam-Azhimala coastline is famous for its breathtaking sunset views. The vibrant hues of the setting sun over the Arabian Sea create a mesmerizing display that

attracts visitors from all over the world. Many tourists gather along the shoreline to witness these spectacular sunsets.

Fishing Villages: The presence of fishing villages like Vizhinjam adds a cultural and authentic dimension to the coastline's aesthetics. Visitors can observe the local fishing activities, visit the fishing harbour, and explore the lifestyle and traditions of the fishing communities.

Ayurvedic Spas: Kovalam is also renowned for its Ayurvedic wellness centres and spas. The aesthetics of well-maintained gardens, traditional architecture, and a focus on natural treatments contribute to a sense of tranquillity and well-being.

Historical and Cultural Attractions: The region has historical and cultural attractions such as the Vizhinjam Rock Cut Cave Temple, which features ancient rock-cut sculptures, and various temples that provide insights into the rich cultural heritage of Kerala.

Water Sports: The coastline is popular for water sports, including surfing, snorkelling, and boat rides. These activities add an element of adventure to the natural aesthetics of the region.

Overall, the Vizhinjam-Azhimala coastline in Kerala offers a perfect blend of natural beauty, cultural richness, and recreational opportunities. It is a place where travellers can immerse themselves in the aesthetics of the coastal landscape while enjoying the warmth of Kerala's hospitality.

The CRZ 1991 had categorised this coastal zone and adjoining coastal waters as Areas of Outstanding Natural Beauty' (AONB) which was listed as CRZ I area (geomorphologically important and environmentally sensitive area). This was to safeguard the unique aesthetics of the area, to protect the cliff and headland ecosystems that include rocky outcrops that spread to nearshore, so that this pristine location will be preserved for coming generations. The land area adjoining the port consists of the Vizhinjam – Azhimala coastal stretch which is sparsely populated. The major land use of the area was tourism related activity zones and beach resorts. Resort people were compensated when these areas were taken over for the port. But the aesthetics, which have unmeasurable existence value, are lost for the present and future generations.

The high vulnerability of the coast to coastal erosion, coastal flooding, the rich biodiversity of its coast and coastal waters and the aesthetic uniqueness of the coast have been misrepresented or intentionally masked in the DPR and EIA for obtaining the environmental clearance.

In Conclusion

Without an iota of doubt, the VISL and all the studies which it has commissioned, have not adequately taken the advice proffered by eminent earth scientists or coastal engineers.

The ill-conceived construction of this commercial port within a picturesque natural harbor has triggered a cascade of devastating consequences, reshaping the very essence of this coastal region. The long breakwater, a symbol of this shortsighted venture, has disrupted the delicate balance of wave dynamics and longshore drift, resulting in unbridled erosion that relentlessly erases the coast's once-pristine features. This rampant erosion is not only a stark testament to the folly of the endeavour but also a sombre reminder of how ill-conceived human intervention can unravel the very fabric of nature's design.

The colossal ecological toll is equally harrowing. The relentless dredging required to create the land for the docks and maintain the channel's viability has unleashed a catastrophic loss of marine biodiversity. This area, renowned for its intricate rocky reefs teeming with life, now bears the scars of irreparable damage. The livelihoods of countless fishers, intricately woven into the fabric of these waters for generations, will be needlessly obliterated. Their cultural heritage, their sustenance, and their connection to the sea have been sacrificed at the altar of ill-advised and unchecked monopoly-controlled 'industrial progress'.

Moreover, the pervasive consequences of this misguided endeavour have permeated another facet of this once-thriving coastal community. The vibrant tourism industry, once nurtured by the allure of pristine beaches and captivating aesthetics, has been ruthlessly decimated. The unsightly presence of imposing cranes, the insidious cloak of pollution, and the obliteration of the once-proud Kovalam beach's scenic beauty have repelled tourists and shattered the economic backbone of the region. The scars of this industrial monstrosity serve as a stark reminder that the reckless pursuit of commercial gains can ravage not only nature's intricate tapestry but also the essence of a community's identity and prosperity.

The truth is that none of the detailed project proposals, the environmental and social impact assessments or any of the subsequent studies undertaken by the VISL have addressed these vital geomorphological, biodiversity and socio-economic unidirectional externalities. To that extend, the citizens of Kerala have been kept in the dark about the true ecological, social and economic costs of the 'dream port' under construction.

6: Biodiversity and Ecosystem Services

The coastal waters of Vizhinjam are renowned for their rich marine biodiversity and the essential ecosystem services they provide. This region boasts a diverse array of marine life, including various fish species, rocky reefs, corals, and other vital components of coastal ecosystems. The pristine waters of Vizhinjam support traditional fishing communities and sustain the livelihoods of many who depend on the abundant resources offered by the marine environment. Moreover, the coastal ecosystems play a crucial role in supporting the local economy and providing recreational and cultural value to the community.

The construction of a container port in Vizhinjam is expected to have significant impacts on both the marine biodiversity and ecosystem services in the region. The process of port construction often involves dredging, land reclamation, and infrastructure development, which can disrupt and damage fragile coastal ecosystems, including corals, rocky reefs, and seabed organisms. Increased shipping traffic and port operations can lead to pollution, habitat degradation, and alterations in water quality, all of which may harm the diverse marine life. Furthermore, the development of a port can also adversely impact local fishing communities and their traditional livelihoods, potentially leading to socio-economic challenges in the area. Balancing the economic development facilitated by the port with the conservation of marine biodiversity and sustainable ecosystem services is a significant challenge that needs to be addressed in Vizhinjam.

This chapter describes in detail the biodiversity in the context of Vizhinjam as a natural habitat, ensuring sustainability of resources for fisheries. It also depicts the rocky reefs as an important and unique ecosystem and habitat diversity that demands conservation. The ecosystem services resulting from this biodiversity are also briefly addressed and an effort is made to provide an initial value estimate of this.

Biodiversity of Vizhinjam Bay and surroundings

Since 1951 Vizhinjam Bay has been considered as an important fishing centre, higher level of fishing activities and availability of large amount of fish stocks (Nayar, 1958). The Vizhinjam site could be described as a fringing rocky reef as the rocky boulders were located directly offshore of rocky coastal areas. This site ranged from 1 to 10 m depth and included large boulders (3m diameter) near the shore, graded into lower relief boulders and a sandy bottom at 10m depth (Sluka et al., 2011). Breakwater and coastal armouring structures like large rock boulders and polypods can act as an excellent artificial reef. The Vizhinjam coast is the best example of these kinds of transformations. Ravinesh and Biju Kumar (2013) documented intertidal regions of Kovalam and Vizhinjam rocky regions with 147 species, including 32 seaweeds, 11 sponges, six coelenterates, two bryozoans, 31 molluscs, seven annelids, two sipunculids, 40 arthropods, nine echinoderms and seven species of ascidians were recorded from the location. Baiju et al. (2016) documented 127 species, including marine algae (8 species), sponges (7 species), cnidarians

(7species), Platyhelminthes (1 species), annelids (3 species), arthropods (22 species), molluscs (42 species), echinoderms (20 species), chordates (tunicates, one species) and fishes (15 species) from this location. Anu et al. (2017) recorded 114 species of including 13 species of algae and more than 101 species of an invertebrate (Porifera: 3 species; Cnidaria: 1 species; Platyhelminthes: 1 species; Bryozoa: 2 species; Annelida: 5 species: Nemertea: 1 species; Mollusca: 49 species: Arthropoda: 30 species; Echinodermata: 7 species and Tunicata: 2 species). Khan et al. (2017) recorded colonial ascidians total of 15 species from 10 genera and five families. George et al. (2019a) recorded 15 species of stony corals belonging to 6 genera and five families from Vizhinjam and nearby localities. Vinod et al., (2019) recorded ten species of sponges from the Vizhinjam bay. Sirajudheen and Biju Kumar (2013) documented 101 species of ornamental fish categorized under eight orders, 37 families and 66 genera. Recently Baiju et al. 2019 listed 232 fish species under 2 Classes; 62 Families and 114 Genera from the rocky reefs were reported from underwater visual surveys.

The biodiversity of Vizhinjam is very high, and the previous and recent studies have revealed more than 250 invertebrates and 250 species of Pisces from Vizhinjam and nearby localities (Pillai and Jasmine 1991; Kuriakose and Nair 1976; Appukuttan et al., 1987; Pillai and Jasmine 1995; Jasmine et al., 2009; Sluka et al., 2011; Ravinesh and Biju Kumar 2013; Sirajudheen and Biju Kumar 2013; Ng and Kumar 2015; Baiju et al., 2016; Gardner et al., 2016; Anu et al., 2017; Baiju et al., 2019; George et al., 2019a,b,c; Vinod et al., 2019; Gomathi et al., 2020 and Khan et al., 2020).

The average annual marine fish landing of Vizhinjam during 2004-2013 fluctuated from 13,119 to 23,798 t registering an average catch of 19,462 t. Standard effort fluctuated over the years with a minimum of 53,772 during 2011 and a maximum of 1,21,524 during 2005 with an average of 91,491 units. Pelagic finfishes contributed 78.4% to the total catch, followed by demersal finfishes (10.5%), crustaceans (0.8%) and molluscs (10.5%). Boat seine contributed 39% to the total catch, followed by drift gillnet (31%) and motorised hooks and line (20%). Landings of significant pelagic resources registered a marginal increase till 2009, after which the catch decreased drastically. Tunas contributed 33.8% of the total pelagic landings, followed by clupeids which formed 27.5%. Mackerel landings showed a gradual increase from 465 t in 2004 to 2,869 t in 2008 and subsequently declined with fluctuations. One of the significant resources, Carangids also showed fluctuations in their landings with top landings during 2009. Trichiurids showed wide fluctuation, with peak landings during the period 2004-2007. Among demersal finfishes, perches formed 26.6%, followed by elasmobranchs (21%) and flatfishes (10.4%). Highly seasonal crustacean landings showed a declining trend over the years; penaeid prawns, on average, formed 59.56% of total crustacean landings, followed by Acetes which constituted 20.7% and the rest by crabs. Total cephalopod production increased from 836 t in 2004 to 2,891 t in 2012 and comprised mainly squids and cuttlefish (George et al., 2019c).

A recent compilation by Ravinesh and Biju Kumar (2023) consider the total diversity of species recorded from the region as 1200 species, represented under various phyla.

Table 1: Species Biodiversity at Vizhinjam	
Phylum	Number of species
Porifera	69
Cnidaria	31
Chaetognaths	8
Platyhelminthes	2
Nemertea	1
Mollusca	225
Annelida	10
Bryozoa	1
Arthropoda	70
Echinodermata	36
Tunicata	58
Chordata (Fishes)	536
Chlorophyta	34
Ochrophyta	41
Rhodophyta	78
TOTAL	1200

The Venue of Rocky Reefs

The coastal waters just beyond Vizhinjam contain a unique marine ecosystem of coastal reefs. These reefs are the main livelihood source of traditional fishermen, which they referred to as *paaru* in the local language. These reef ecosystems were discovered by fishermen themselves over the years and they have been fishing over them for generations. **(See Appendix A for details)**

The Vizhinjam port area (from Vizhinjam fishing harbour to Mulloor and to Adimalathura) is surrounded by 15 rocky reefs and few cliffs and a similar number of promontories (Kerala State Biodiversity Board-KSBB 2017; Friends of Marine Life -FML 2015 and 2016). The site could be described as a fringing rocky reef as the rocky boulders were located directly offshore of rocky coastal areas (Sluka, Mary and Lazarus 2011). These fringing rocky reefs are reported to be at depths ranging from 1 to 10 m. Presence of scattered or encrusting corals or hermatypic corals were identified in the area (Sluka and Lazarus 2006; Pillai 1997; Sluka et al., 2011). Rocky reefs support high abundance of fishes and other typical benthic invertebrates like sea sponges, sea stars, sea urchins and many more. Another important feature is the high level of algal cover observed at the site. In terms of macro algae, very limited presence is identified because of the large number of herbivorous fish and urchins. Large schools of parrotfish (Scaridae) and

surgeonfish (Acanthuridae) were frequently observed around the reef areas. The natural rocky shores are characterised by microenvironments or microhabitats like rock pools, holes and crevices that aid great proliferation of species. Vizhinjam reefs have been described as 'patchy coral reef' or 'isolated coral patch' areas of Southern India.

Chandrasekharan et al (2019) and Lazarus and Chandran (2016) have opined that rocky reefs are like coral reefs in terms of providing habitats and harbouring biodiversity, and they are the main supporters for the growth of seaweeds. Seaweeds are a crucial coastal ecosystem amid the climate change conditions, which provide food and habitat for other marine species, cleans coastal waters by removing excess nutrients from runoff, and absorbs carbon dioxide from the water. Many countries advise and are working on planting seaweeds for the protection from ocean acidification and seafood for the future. Presence of natural seaweeds in the Vizhinjam bay is identified by many of the publications cited here.

Several studies are available that describe the unique Vizhinjam rocky habitats and their ecological and pharmacological importance. Pillai and Jasmine (1995) reported scleractinian coral diversity along the rocky reefs of Mulloor and Vizhinjam. Sluka and Lazarus (2004) identified the most abundant benthic colonizers like fine turfing algae, encrusting sponges, barnacles, and mussels in the rocky substrata of Vizhinjam. The abundance and distribution of Hump head wrasse (*Cheilinus undulatus*) species on the west coast of India including in Vizhinjam was documented as one of the main stations by Sluka and Lazarus (2005).

Vizhinjam has many rocky outcrops which provide substratum for a variety of benthic organisms including soft corals, gorgoniids, hard corals, sponges, mussels, and algae (Mary, 1998; Mary & Lazarus, 2004; Sluka & Lazarus, 2009; Mary et al. 2011). Baiju et al. (2019) reports that the physical structure of the reefs supports the ichthyofauna as shelter, nursery ground and food source.

These rocky reefs are islands of biodiversity in the surrounding sea of land and mud. Non-coral biodiversity is likely high in these areas, especially sponges and octocorals, though the extent of other taxonomic biodiversity is unknown.

Biodiversity Hub

The Kerala State Biodiversity Board (KSBB) carried out the preparation of a marine biodiversity register (KSBB 2017) with people's participation. This was the first People's Marine Biodiversity Register (**See Appendix A**) in the country carried out by the local NGO Friends of Marine Life consisting of youth from the fishing communities. For the study, details of rocky reefs from 10 m to 50 m depth were collected by KSBB scientists and researchers in collaboration with traditional fishers in the area. The study team documented 23 rocky reefs (including ship and boat reefs) from Kappil to Puthukurichy area and 69 reefs (including one boat reef) from Valiyathura to Pozhiyur (which includes the Vizhinjam port area) in the Thiruvananthapuram district. Out of this 26 near inshore rocky reefs are from Kovalam to Adimalathura, as many as 15 rocky reefs are located within the Vizhinjam port zone. These rocky reefs are not far away from the shore, and

spread out approximately at an average 6m to 15m depth. All these are seen adjoining the 15 promontories of this region.

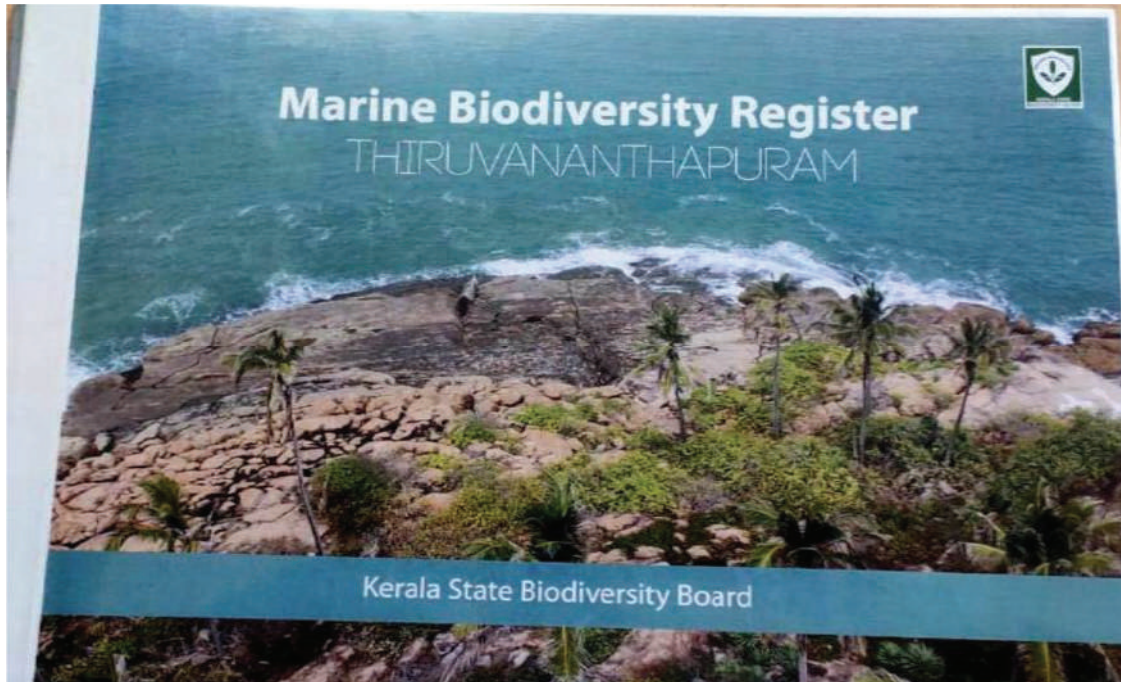


Fig 6.1: Marine Biodiversity Register prepared by Friends of Marine Life, a coastal youth group, for the Kerala State Biodiversity Board (cover page)

Biodiversity is also very rich in the sea beds of Adimalathura, Mulloor and Vizhinjam as well as Kovalam (KSBB 2017, FML 2015,2016). Many small and big organisms live as colonies in these areas. The benthic region in Mulloor has been occupied by small organisms which form colonies and develop into large quantities in the sea. Seaweeds, deep sea like corals, soft corals, sea fans, hydrozoans and many other marine organisms are present in the entire Vizhinjam port site.

One of the peculiarities of the near and inshore rocky reefs of Vizhinjam (including Kovalam) is the presence of mussels in almost all the areas. There are hundreds of fishermen from Kovalam to Adimalathura who collect mussels, crabs, fishes, and ornamental fishes from these rocky reefs. There are also numerous other varieties of organisms like worms, brittle stars, seaweeds, anemones, sponges, ascidians, and mollusks, which depend on these reefs for food, shelter, and breeding. Some of these organisms are immovable and established themselves in this peculiar habitat and some live in crevices. An important observation of the study is that it is impossible for them to shift to some other habitat. The study has provided location maps of the rocky reefs and underwater photos and videos of the organisms which find shelters in these reefs.

A wide variety of edible and ornamental fishes were reported from the reefs (Sirajudheen and Bijukumar 2014; Sluka and Lazarus 2006). As many as thirty-six species (38%) are exported (Sluka and Lazarus (2006). All butterfly fish (Chaetodontidae), remoras (Echeneidae), trunk fish (Ostraciidae), angel fish (Pomacanthidae), scats (Scatophagidae), turkey fish (Scorpaenidae), and

Moorish idol (Zanclidae) are exported to either Maldives or Sri Lanka. Most of the wrasses (Labridae) are also exported to these countries.

The Central Marine Fisheries Research Institute have been collecting ornamental fish from the Vizhinjam coastal waters for its aquarium and research in breeding of ornamental fish. The aquarium is one of the major attractions for the tourists in Thiruvananthapuram.

Biodiversity of Vizhinjam coast and coastal waters is highly diverse and abundant which cannot be ignored in planning any development activities in this coastal zone. Biodiversity of Vizhinjam coast and coastal waters are so abundant and important that researchers have recommended to ensure sustainable use of these resources as well as careful management and monitoring. Arguably, under the present UN directives and the UN Decade on Ecosystem Restoration (2021-2030), the area could be declared as a Marine Protected Area (MPA) (Kelleher 1999).

Vizhinjam coast and the coastal waters are therefore important biodiversity hubs on which the traditional fishers depend for their livelihood fishing. The fact that the biodiversity has been retained, as shown by the KSBB study, highlight the sustainable fishing practices utilised by the fishing communities. Fishers from more than 27 fishing villages in Trivandrum use the Vizhinjam fishing harbour, especially during monsoon months. Any damage to the biodiversity of this coastal system, because of the VISL, will seriously harm the livelihood of these traditional fishers.

In addition, rocky reefs unique to the region are diverse underwater ecosystems that are characterized by the presence of hard substrate, such as rocks, boulders, and cliffs. These habitats are reported to support a rich and diverse array of marine life, making them crucial for the overall health of the marine environment. The biodiversity of rocky reefs is of immense importance for various ecological, economic, and social reasons, and therefore demands protection. Various fish species help maintain population balance within the ecosystem by controlling the populations of other organisms. Rocky reefs support commercial and recreational fishing industries, contributing significantly to local economies. Many species of fish and invertebrates that inhabit these reefs are commercially valuable and provide a source of income and livelihood for coastal communities. Healthy and diverse rocky reef ecosystems often attract tourists and recreational activities such as scuba diving and snorkelling. These activities not only promote environmental awareness but also contribute to the local economy through tourism. Biodiversity within rocky reef ecosystems contributes to their resilience against environmental stressors such as climate change, pollution, and overfishing. The complex interactions among different species help maintain the balance of the ecosystem, making it more adaptable to changes in the environment. Rocky reef ecosystems provide an ideal setting for scientific research. Researchers can study various aspects of marine life, including biodiversity patterns, ecological processes, and the impacts of human activities on these fragile ecosystems. Understanding these processes is crucial for developing effective conservation and management strategies. This is particularly crucial in the context of the UN Ocean Decade of Ocean Science for Sustainable Development (2021-2030) highlighting 'the science we need for the ocean we want'.

Additionally, the reefs themselves can act as natural buffers, protecting shorelines from erosion and storms. Many of the species found in rocky reef ecosystems play crucial roles in providing ecosystem services. Overall, the biodiversity of rocky reef ecosystems is vital for maintaining the health and balance of the marine environment, providing valuable services to both human communities and the natural world. Protecting and conserving these ecosystems is essential for the long-term sustainability of marine life and the well-being of coastal communities.

In the Vizhinjam region, as a precautionary approach, the critical rocky habitats need to be protected and continuously monitored, especially considering their importance in sustaining fishery wealth for the local fishers and in ensuring the vital ecosystem services and as the only habitat of few coral species and endemic sea cucumber (*Thionina bijui*) available in the Kerala State.

The DPR and EIA have ignored or misrepresented this rich biodiversity while planning the Vizhinjam port project and concealed this from authorities/committees and further the port constructions by Adani Ports and SEZ Ltd have not given any attention to this rich and essential biodiversity and customary livelihood practices the local communities in those areas

The CRZ 1991 had categorised the coastal zone and adjoining coastal waters as Areas of Outstanding Natural Beauty' (AONB) which is listed as CRZ I area (geomorphologically important and environmentally sensitive area). This is to ensure the unique aesthetics of the area and to protect the cliff and headland ecosystems that include rocky outcrops that spread to nearshore.

Impact of the Port on the Unique Biodiversity of Vizhinjam

In general, any coastal development activities, including port development, can have significant impacts on marine biodiversity, often leading to both direct and indirect ecological consequences. The impacts that may result from port development include, among other socio-economic development, are the following that includes:

Habitat Loss: The construction of ports often requires dredging and filling, which can lead to the destruction of important coastal and marine habitats such as mangroves, seagrass beds, and coral reefs. These habitats serve as crucial breeding grounds and nurseries for many marine species. The Vizhinjam port site is characterised with many diverse species, benthic organisms, seaweeds, shellfish, corals, fish and other aquatic biota. Some of these bottom habitat and fishery resources have already either been destroyed or near loss after the construction in the Vizhinjam sea.

Water Quality Degradation: Port development can lead to increased sedimentation and pollution from various sources such as dredging, ballast water discharge, and shipping activities. This can result in altered water quality, which can be harmful to marine organisms, particularly those that are sensitive to changes in water chemistry and clarity, such as the mussel beds, and marine fauna listed under various schedules of the Wildlife (Protection) Act of India such as sponges and patchy corals in the Vizhinjam region.

Disruption of Ecosystem Processes: The construction and operation of ports can disrupt natural ecosystem processes, such as nutrient cycling, sediment transport, and coastal hydrodynamics. These disruptions can have cascading effects on the entire marine ecosystem, impacting the abundance and distribution of various species. Some of these features were identified by several observations since the port construction.

Introduction of Invasive Species: Ports serve as major hubs for international shipping, which can inadvertently introduce non-native and invasive species into new marine environments. These invasive species can outcompete native species for resources, leading to a decline in local biodiversity and ecosystem stability. Already a few exotic invasive ascidians have been reported from the Vizhinjam Region.

Physical Barriers and Displacement: The infrastructure associated with port development, such as breakwaters, jetties, and docks, can create physical barriers that obstruct the movement of marine organisms. This can lead to the displacement of species, affecting their ability to find suitable habitats, food sources, and breeding grounds.

Noise and Vibration Pollution: Port activities, including ship traffic, construction, and cargo handling, generate significant levels of noise and vibration. These disturbances can have detrimental effects on marine species, such as marine mammals and fish, which rely on sound for communication, navigation, and foraging. This is specifically important as the region has been recorded as a hotspot of marine mammal migration which also demands further monitoring and studies. (*Dipania Sutaria*, IUCN marine mammal expert group member and Prof A Biju Kumar, University of Kerala, personal communication)

Climate Change Implications: Port development can contribute to greenhouse gas emissions, mainly through increased shipping activities and associated transportation. Additionally, alterations in coastal habitats can reduce the natural ability of ecosystems to act as carbon sinks, exacerbating the impacts of climate change on marine biodiversity.

Socio-economic impacts due to changes in natural resource availability: Port development can have some significant social and economic adversities to the local communities due to the changes in the natural resource availability. Port projects also pose governance challenges to the utilisation of available resources. Since the Vizhinjam port constructions like breakwater are located parallel to the most safe and crowded fishing harbours in Kerala, this can cause adverse impact upon the movement of the fishing boats and thereby increasing transport costs and reducing the productivity of the local fisheries. This also changes the traditional practices of fishing and tourism that might require relocation of the natural depended local communities. There are possibilities of conflicts between and within the various groups of fishers and tourism practitioners about their customary spaces of livelihood practices.

Such adverse effects of port development have been acknowledged by several organisations like the World Bank, the Asian Development Bank and the International Association of Ports and Harbours. To mitigate these impacts, it is crucial to implement comprehensive environmental

impact assessments (CEIA), adopt sustainable port planning and design practices, and prioritize the conservation and restoration of marine ecosystems through measures such as the creation of marine protected areas and the implementation of sustainable shipping practices. Were these factors considered by the EIA of Vizhinjam port both for the identification of the present port location and the construction activities in the sea like dredging, disposal of dredged materials, and transport of construction materials?

Other Possible Impacts on Biodiversity

Ports can have both direct and indirect impacts on coastal marine biodiversity. The extent and nature of these impacts can vary depending on factors such as the size of the port, its location, the design of its infrastructure, and the mitigation measures in place. Here are some of the other potential impacts of ports on coastal marine biodiversity:

Marine Traffic: Increased vessel traffic associated with ports can pose risks of ship strikes to marine mammals, particularly in areas where these species are known to inhabit.

Spills and Accidents: Accidents such as oil spills and chemical leaks can occur in ports, leading to acute pollution events that harm marine life and disrupt ecosystems.

Altered Hydrodynamics: The construction of breakwaters, jetties, and other port infrastructure can alter coastal hydrodynamics, including tidal flows and sediment transport. These changes can have cascading effects on local ecosystems.

Introduction of Lights: The installation of port lighting can disorient marine species, including sea turtles and nesting birds, which rely on natural light cues for navigation and reproduction.

In addition to these, a recent global study (Simmons et al: 2022) pertaining to a particular large maritime country's ports around the world and their impacts on marine socio-ecological systems make the following observations:

Ports present the greatest impact risks to marine systems, in terms of both magnitude and area at risk, with power plants, roads, and other facilities presenting relatively high localized risks.

The intensity of these anthropogenic impacts is often greatest in coastal waters which are one of the top priority areas for marine biodiversity conservation. The continual growth of infrastructure and pollution associated with coastal development threatens the structure and function of marine socio-ecological systems around the world.

The risks to marine biodiversity in Vizhinjam need to be understood against this backdrop and more importantly in the light of its unique and complex ecosystem in the Indian region where the three seas (Indian Ocean, Arabian Sea, and Bay of Bengal) meet. Vizhinjam is one of the main fishery zones of the south-eastern Arabian sea and the most important artisanal fish landing

centres of Kerala and among the twenty-seven fish landing villages of Thiruvananthapuram. Nationally also this coastal zone supports one of the largest artisanal fisher communities. It is enclosed by two rocky promontories extending into the sea, providing a protected bay affording excellent opportunities for fishing operations even during heavy monsoon. Proximity to the biodiversity-rich 'Wadge Bank' an ecologically sensitive area, makes this area more significant in fish diversity. Two monsoon seasons especially southwest monsoon play a pivotal role in the rich biodiversity in the area (George et al. 2011).

In Summary

Vizhinjam Bay is a crucial ecosystem along the Kerala coast, housing more than 20 percent of the state's coastal sea biodiversity. Various scientific studies conducted by both national and international researchers have confirmed its significance. Before the construction of the Vizhinjam International Seaport (VSL), the region boasted an impressive 1,200 recorded species across various phyla. However, the port's construction involves dredging coastal waters, reclaiming land, and destroying rocky reefs, causing the disruption and potential extinction of key ecosystems and species, even before 70% of the construction is complete. This destruction calls for immediate action to protect, restore, and enhance these critical ecosystems, in line with the UN Decade of Ecosystem Restoration, not only to mitigate climate change impacts but also to safeguard marine life and the livelihoods of traditional fisher communities.

The traditional fisher communities in Thiruvananthapuram have long depended on these key biodiversity areas for their livelihoods, with abundant fish catches reported in the past. The Vizhinjam region has been a significant center for fisheries, and these nature-dependent communities have conserved and sustainably used the resources for generations. However, the port project threatens their way of life, as they lose access to customary fishing areas without adequate compensation. Their ability to transition to non-fishing jobs is limited, and the project's negative impacts on marine biodiversity and coastal ecosystems, as well as the socio-economic and cultural values of the region, pose imminent risks to their livelihoods and well-being. It is essential to note that the Detailed Project Report (DPR) and Environmental Impact Assessment (EIA) for the Vizhinjam port project have significantly underestimated the area's biodiversity, potentially leading to catastrophic consequences for marine life and coastal communities, especially as the port becomes operational. The adverse impacts once the port becomes operational have not been considered in the above discussions. But it is certain that the impacts will be further compounded with numerous additional activities at that time.

Value of Ecosystem services

In the section above, the extent and uniqueness of Vizhinjam, from the perspective of marine biodiversity is well apparent and it has been very well documented by the scientific community.

The fact that the marine biodiversity was ‘out of sight’ can be one of the important reasons why the DPR and EIA for the port have not dealt with the matter adequately. The EIA does mention marine biodiversity and alludes to the work of the CMFRI and makes a list of the different 73 ornamental species (EIA Table 4-22) and very clearly indicates that most of them are rocky reef associated. However, apart from mentioning this fact there is no mention of any possible “impact” of the port on this biodiversity.

Assessing the value of ecosystem services lost because of the VISL port construction is more difficult to make and more contentious too. The literature and research work has been largely confined to the nature of biodiversity which has been lost as we had indicated above (See above).

Coastal Ecosystem services are usually considered to have four types of values;

- 1) Direct-use value which is harvesting of marine resources, the recreation, and cultural activities. These are usually the benefits of people who live within the ecosystem.
- 2) Indirect use value - which includes storm and flood protection, natural filtration of fresh water and carbon sequestration. The communities benefitting indirectly fall within a larger radius of the coast like upstream towns, villages, and districts.
- 3) Option value - which includes coastal ecosystems’ economic benefits in the projected future. These could include future-based food security, future-energy needs from renewable energy, the continuation of cultural activities and enhanced flood protection.
- 4) Non-use value - which includes awareness of the resource and use without directly consuming the resources. This could refer to the marketing of recreational experience like beach tourism as well as other allied sectors like travel, logistics, and the advertisement industry. The categories are highlighted in the figure below.

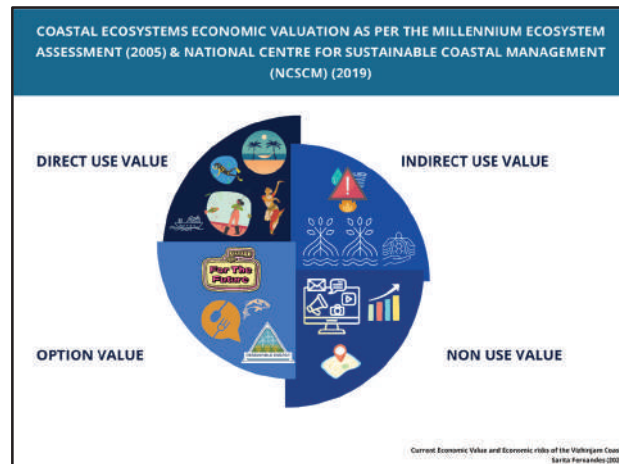


Fig 6.2: Types of Ecosystem services

Value of Rocky Reefs and Sensitive Areas

Our focus here is on the rocky reefs which have been submerged in the process of the creation of the port area with sand which was dredged from the sea and the fragile ecologically sensitive areas along the length of the coastline which is immediately affected by the port.

The value of ecosystem services provided by rocky reefs can be challenging to estimate precisely. However ecosystem services provided by rocky reefs may include:

1. **Fisheries:** Rocky reefs often serve as habitats for various commercially important fish species. These ecosystems support fisheries by providing breeding grounds and habitats for fish and other marine species. The value of this service can be substantial and may vary depending on the species and the local fishing industry.
2. **Coastal Protection:** Rocky reefs can act as natural barriers that protect coastlines from erosion and storm surges. This service helps prevent property damage and loss of life during extreme weather events, and the economic value of this protection can be significant. The recurring cyclonic events across the Kerala coast and the damage to coastlines is an alarming indicator on the need for natural flood protection barriers like rocky reefs and other coastal ecologically sensitive areas.
3. **Biodiversity and Tourism:** Rocky reefs are often sites of high biodiversity, attracting tourists, divers, and snorkelers. This can have economic benefits for local economies through high-value tourism, creating jobs, seasonal livelihoods for the community and generating revenue.
4. **Water Quality:** Ecosystems like rocky reefs can improve water quality by filtering pollutants and maintaining a healthy balance of nutrients. Clean water is essential for human consumption and various industries, and the cost savings related to water treatment and improved water quality can be considered an ecosystem service.

5. **Scientific and Educational Value:** Rocky reefs serve as natural laboratories for scientific research and education. This contributes to the knowledge and understanding of marine ecosystems and can have long-term benefits in terms of sustainable resource management and conservation.
6. **Cultural and Aesthetic Values:** Many communities have cultural, spiritual and aesthetic connections to rocky reef ecosystems, and the preservation of these areas can be seen as an intrinsic value.

While there may not be a single, universally accepted estimate for the value of ecosystem services provided by rocky reefs, studies have attempted to quantify these values in specific regions or for specific services. The economic value of rocky reef ecosystem services can vary significantly depending on the local context and the specific services considered.

We are using the national estimates made by researchers at the National Centre for Sustainable Coastal Management (NCSCM) in this regard (Devaraj Ramesh et al. 2020). These estimates do not specifically cover rocky reef ecosystems for Kerala.

However, to provide at least a minimum value, we have accepted to take their overall estimates as a proxy for rocky reefs.

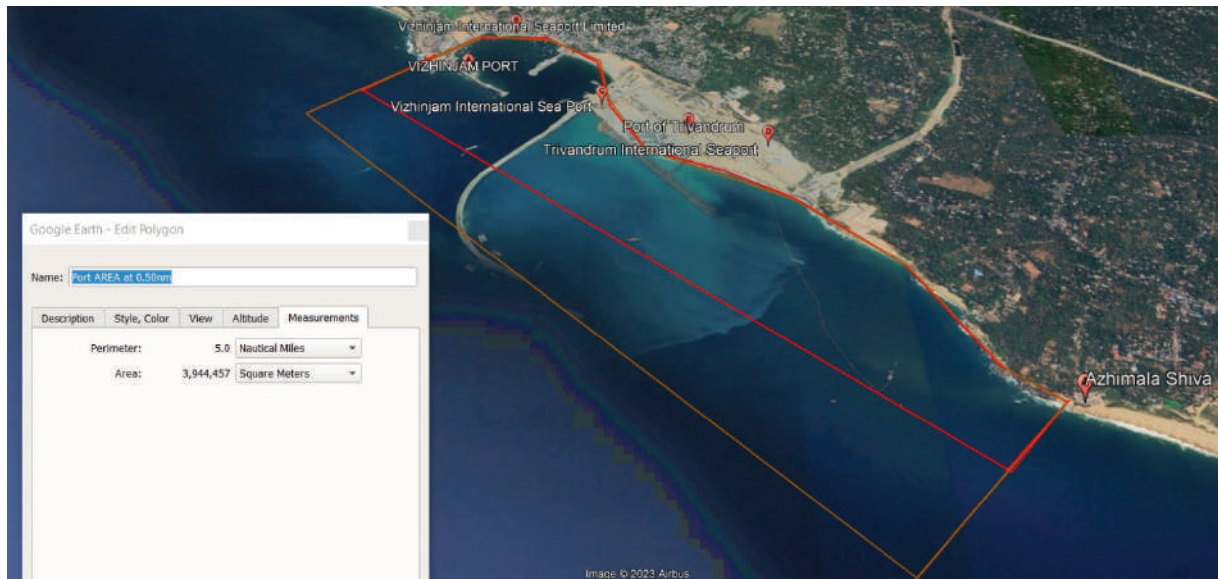


Fig 6.3: Minimal functional Area covered by the Port Credit: D. Nandakumar

Accordingly, corals reefs are estimated to be valued at Rs.12.70 lakhs/ha and the ecologically sensitive areas at Rs 11.48 lakhs/ha.

Using the coral reef values as a proxy for rocky reefs, the 400 ha of rocky reefs in Vizhinjam produce an ecosystem service value of $12.70 \times 400 \text{ ha} = \text{Rs } 5080 \text{ lakhs}$ or **Rs 50 crores per annum**.

The ecologically sensitive areas are valued at Rs 11.48 lakhs/ha (length of coastline of Vizhinjam area is taken as 5 km (direct by sea) between the light house and the Aazhimala Temple. If this area is extended seawards by 3 km the area is 15 sq.km which is 1500 ha. Hence the value will be $1500 \times 11.48 = \text{Rs.}17220$ lakhs or **Rs 172 crores per annum**

Hence the ecosystem services value from rocky reefs and sensitive areas is approximately **Rs 222 crores per annum**

Value from Reef Fishing

If we are to consider the direct use value from fisheries, one approach would be to consider a minimum earning per day from fishing and estimate this value for the fishers of Vizhinjam who fish on the reefs (mussel gatherers) or are involved in fishing activity which depends on the existence of the reefs for its success (shore seines and kattumaram fishers). We must also add to this the livelihoods lost for women who depend on the harvest of the fishers to get the fish which they take to the markets.

According to the assessment made by the project authorities there were about 670 fishers in the strict confines of the project area who benefit from the reefs and they were compensated to the tune of Rs. 5.6 lakhs each. The basis of their compensation calculation was to provide an earning of Rs 300/day for a period of 5 years.

This compensation we consider to be totally inadequate and a far cry from the real earnings of fishers in Vizhinjam. Taking an average income per day is a faulty basis for calculation of a fisher's income. However, in the current circumstance, if we take the Kerala minimum wage of Rs 600/day for 300 days and calculate an income stream for at least 10 years we will arrive at a compensation amount of Rs. 18 lakhs per fisher for the period or Rs.1.8 lakhs per year. Taking only the 670 fishers the potential value of reef fisheries is estimated to be (Rs 1.8 lakhs X670 = 1206 lakhs) or **Rs. 12 crores per annum**.

Value from Shore-Seine Fishing

Shore-seine is one of the most traditional and collective means of fishing undertaken in the villages within the zone of influence of the Vizhinjam Port. About 30 people are needed to operate a shore seine. Eight villages at the north of the port having 100 shore-seines have lost their fishing potential due to the erosion of the beaches. Apart from the fact that the capital equipment – craft and seine – now lie wasted, there is also a loss of employment for approximately 3000 fishers. If they bear a loss of Rs 600/day for a period of 150 working days, the loss of value is – $\text{Rs } 600 \times 3000 \times 150 \text{ days} = \text{Rs } 2700$ lakhs or **Rs 27 crores per annum**.

Value from Sale of Fish by the Women

According to the CMFRI, there were 577 women involved in fish marketing in the Vizhinjam port area. They are almost exclusively from the Christian community. By a simple assumption that women add about 20 percent to the value of the landed fish, we estimate their loss of earning to be 20 percent of Rs 12 crores plus Rs 27 crores. This amounts to about **Rs. 8 crores per annum**. Another approach would be to assume that their average earnings from marketing fish for 200 days would be Rs 600 per day and therefore for 577 women the earnings lost is Rs. **7 crores per annum**.

Value of Beach for Sport and Recreation

The beaches form the space for sports and recreation in the fishing villages. Men, women, and children of all ages use the beach as a space for enjoyment and socio-cultural recreation. A more widely known activity on the coast is football. The star footballers of Kerala, many of whom come from the fishing villages, have all had their formative training on the beach sands. For example, the fishing village of Pozhiyur, Poovar and Pulluvila are called the “Santosh Trophy Villages.” It is of consequence to note that most of these players are from the fishing villages within the zone of influence of the Vizhinjam Port.



Fig 6.4: Coastal Football

Credit: South First

To provide a valuation of the services provided by beach space, we can take a standard club access fee per annum of Rs 30,000 in Kerala as our value benchmark. On this basis, the coastline length which we consider within the Vizhinjam port influence zone which has lost its beach space (villages to the north) can be taken as 15 kilometres of coastline. Assuming a coastal space of 200 metres of beach used for such purposes, we have a 3 square kilometre realm. The population density on this coastal belt is 2500 persons/square kilometre. Therefore, the value of realm – for its sports and recreational use is -- $3 \times 2500 \times \text{Rs. } 30,000 = 2250$ lakhs or **Rs 23 crores per annum**.

Value of Beach for Fish Drying Activity

Beach space is also a source of livelihood for women who involve in drying fish. The loss of beach has reduced the opportunity for many women to sustain this activity as the already limited space has been taken over for port related activities.

It has been estimated that dry fish worth Rs 27.5 crores was marketed outside Kerala in 2015. Using this value as a proxy we estimate that, adjusting for inflation, during the period 2016-2023 the loss of revenue was about **Rs 1crore**.

Value from Tourism

When natural coastal marine habitats such as rocky reefs are destroyed or replaced with artificial structures, there is evidence that the biodiversity of the area (measured in number of species) tends to decline.

To these values we need to add at least the value of fisheries which are obtained from the rocky reefs; the tourism income which is directly related to reefs such as snorkelling; the protection which these reefs provided in the form of calmer coastal waters.

However, all these possibilities have been lost since some of the reefs have been destroyed during the dredging and those that remain will be within the port jurisdiction, and hence out of bounds for fishers or tourists.

Tourism and recreation related ecosystem services which materialise through the biophysical characteristics and qualities of ecosystems can be computed in monetary terms based on consumer surplus approach (Mukhopadhyay et.al. 2020). The potential for Kerala's coastal tourism is estimated as Rs. 9708 crores for an estimated coastal ecosystem area of 3726 sq.km. On a pro-rata basis, the value of recreation related ecosystem services along the impact zone of Vizhinjam Port is **Rs.78 crores per annum**.

Value of Beaches Lost to Erosion

Beaches are far more than mere expanses of inert sand. They serve as vibrant hubs for a multitude of socio-cultural and occupational activities within fishing communities, providing livelihoods and cultural identity. For the common citizen, they offer precious spaces to relax and unwind, fostering a sense of leisure and connection to nature.

Additionally, beaches play a pivotal role in providing a range of direct and indirect ecosystem services. They contribute to coastal protection, acting as natural buffers against erosion and storm surges, thus safeguarding coastal communities and their assets. These sandy shores support diverse ecosystems, offering habitat for various species and promoting biodiversity. In

essence, beaches are invaluable natural assets that extend well beyond their picturesque appearances and beyond the existence of current populations.

Just as even those who have not seen the Himalayas do place an intrinsic value in merely knowing that they indeed exist, so it with beaches.

Therefore, the value of beaches is far more than real estate. There is an intrinsic value for beaches which we cannot replace in any other manner than allowing them to exist as they are. Beaches have an enormous option and existence value.

One way we can estimate their existence value in monetary terms is to calculate the cost of restoring and rebuilding them when they get destroyed by human folly.

To make an approximation of these costs for the Thiruvananthapuram coast north of the port we use the available data from the efforts made in Pondicherry, which lost its beaches due to a port, and which was restored and is being gradually rebuilt through a variety of measures. The estimated cost is about Rs 50 crores.

If we go by this estimate and consider that Thiruvananthapuram coast to be far deeper and the waves much stronger, there is need to make an additional provision of Rs 25 crores. Thus, assuming a cost of Rs 75 crores per kilometre of affected coastline we can estimate the ecosystem service value lost due to erosion of beaches to be Rs 75 crores X 15 km = Rs 1125 crores.

Sand is required for the beach nourishment. Sand must be deposited over an area of 1000 metres of land and 150 metres of sea perpendicular to the coastline of an eroding coast. It must also have a height of 4 meters. This works out to 600,000 cubic metres of sand for nourishment of 1 kilometre of eroding beach. The Cochin Port Trust estimates a cost of Rs 600 per cubic metre of sand. Therefore, by this conservative estimate a sum of Rs 36 crores is required to nourish one kilometre of eroded coastline and Rs 540 crores for the 15 kilometres of the port impact zone.

Thus, the total cost of replenishment of the beach – Rs 1125 + Rs. 540 crores = **Rs 1665 crores** may be considered as a proxy to approximate the value of the services rendered by the beach ecosystem to society.

Even by these hasty and modest calculations the total value of ecosystem services totals to a sizeable sum of **Rs.2035 crores**. Of this half can be considered loss on an annual basis and the other half a rough approximation of a one-time loss.¹²

¹² While the calculations provide a rough estimate of the economic value of ecosystem services affected by the port construction, they should be interpreted with caution due to the limitations in data and assumptions. Conducting more comprehensive local studies and engaging with experts and stakeholders can provide a more accurate understanding of the impacts and values associated with the construction of the Vizhinjam port.

In Conclusion

The Vizhinjam port project, while addressing economic development, has led to the loss of valuable marine biodiversity and crucial ecosystem services. The Environmental Impact Assessment (EIA) for the port inadequately addressed the impact on marine biodiversity and coastal ecosystems. The ecosystem services, particularly those provided by rocky reefs, include support for fisheries, coastal protection, tourism, water quality, scientific research, cultural values, and aesthetics – and the very fact of their existence.

Economic valuation is useful to provide a fair estimate for sustainable and equitable development plans of a region. It can be used as a tool to sustainably develop and regularise coastal zones, which are constantly changing, dynamic and benefit a large set of present and future stakeholders.

This underscores the importance of comprehensive environmental assessments, considering the true value of coastal ecosystems, and raises questions about the long-term costs and benefits of large-scale coastal development projects¹³ in the context of environmental sustainability and economic development.

Sand beaches are not just scenic landscapes; they are the lifelines of our coexistence with nature. They offer direct and indirect use values, from recreation to coastal protection. The option value whispers of future discoveries, and the existence value reflects our deep appreciation for their presence.

Let us cherish and protect these sandy treasures, for they enrich our lives today and hold promises for the future, both known and unknown.



¹³ The next large project on the coast will be the coastal highway. For an excellent account. See Nayakam I, 2023

7. Fishers' Perceptions

In 2017, the ferocious Cyclone Ockhi wreaked havoc, tragically claiming the lives of several fishermen from Thiruvananthapuram District. The loss of life was compounded by the lack of coordination in rescue operations during this highly unpredictable extreme weather event.

However, the unexpected deluge that engulfed Kerala in 2018 painted a different picture. It was the resilient coastal army of fisherfolk who rose to the occasion, mobilizing their own boats and engines to embark on daring rescue missions in the upland districts. It is worth noting that among those leading the charge were some who had themselves survived the Ockhi cyclone in 2017, enduring 24 to 48 gruelling hours in the tempestuous sea before rescue arrived.

The media and subsequent literary works dedicated ample space to recount the selfless actions of these unassuming heroes of Kerala. For them, extending a helping hand to their fellow brethren in the face of perilous waters was not just a duty but an embodiment of their deep-rooted 'oceanic values.' Their acts of valour earned them well-deserved accolades from both the government and civil society, solidifying their status as the unsung heroes of Kerala.

Regrettably, by 2019, the collective memory had seemingly forgotten these remarkable actions. As coastal homes in Thiruvananthapuram began to be devoured by the relentless sea, which was a consequence of alterations in coastal hydrodynamics induced by the construction of the Vizhinjam port's breakwaters, there was a conspicuous absence of empathy from civil society. The fisherfolk, compelled to eke out an existence in substandard conditions within cement warehouses, found themselves in dire straits, their struggles largely overlooked.

While the fishers of Kerala made substantial strides in income and social protection since 1985, courtesy of their collective efforts, they still grapple with a multitude of vulnerabilities. These encompass physical challenges, such as the loss of homes and beaches, ecological threats stemming from extreme events caused by climate change, occupational hazards leading to loss of life and fishing days without compensation, economic burdens tied to rising fishing costs, and ongoing societal discrimination – particularly during the Covid-19 crisis of 2020 and 2021.

With the construction of the VISL port, the jeopardy posed to their homes and beaches has now emerged as a significant existential threat. Addressing these issues requires a comprehensive approach, encompassing both short-term and long-term remedial measures that target the root causes responsible for their plight.

As part of the study being carried out by the JPS on the impacts of VISL, a series of consultations with the primary stakeholders, the fisher community, were held. The fisher community of

Thiruvananthapuram coast are traditional fishers who may be termed 'ecosystem people'¹⁴ (Dasmann 1989). Their life and livelihood are intrinsically embedded with the coast, the sea, and its related ecosystems. Any adverse effects to these will have serious bearing on the present and future course of their lives.

Public consultation was primarily to gather information and views of the local community, especially the active fisher people on resources, loss of biodiversity, loss of habitat, coastal erosion, loss/damage to houses and property, loss of livelihood, disturbance to fishing and associated activities, increasing conflicts among various groups of fishers over customary livelihood areas, disturbance to the people's social fabric, disturbance in the tranquillity of Vizhinjam fishing harbour and other matters.

The views of the community emanate from their experience and traditional knowledge. The information thus gathered will help to validate the observations and analysis in the study to make it more authentic and to cross check many of the findings from other sources. The treasure of traditional knowledge with them could enrich the existing understanding of coastal and nearshore processes.

Accordingly, a series of interaction sessions in the form of public consultations were held with the local community from different fishing villages in and around the upcoming Vizhinjam port on 15, 16 and 17 June 2023

Public Consultation Findings

Sea-going fishermen, representatives of fishers and other associated organisations participated in the public consultation. They presented the difficulties they face as the port construction progresses. Ongoing port activities like dredging of the coastal waters, construction of breakwater, reclamation of coastal waters, and the movement of barges bringing stones for port constructions have already caused difficulties for fishing activity and affected all sectors of their livelihood. What we detail below are the major issues and concerns with respect to their livelihood and existence which they faced since December 2015, when construction activities for the port got started, and those anticipated problems once the port becomes operational.

The team visited the different coastal stretches and observed the actual situation that prevails along these coastal areas including the damages due to coastal erosion and associated difficulties. It was noticed that the monsoon was not active during the dates of the field visit. Even with the weakened monsoon the situation has become difficult for the community and the safety of people are already threatened. The team was informed that the monsoon was comparatively weak last year (2022) also. For the last few years, monsoon as a sea condition has been weakening due to the climate change complications like warming ocean water, changes in

¹⁴ Members of the fishing community of Thiruvananthapuram have staked the claim to be defined as an 'indigenous' community based on the 7 criteria used by the UN for this purpose. https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf

sea currents and cyclonic formations just before the onset of the southwest monsoon in both Arabian Sea and Bay of Bengal.

Concerns and issues (Vizhinjam – Kovalam)

The fishermen informed the committee that their problems at sea have worsened due to the ongoing port construction, leading to significant income losses. They claimed that the port construction began without a proper analysis of costs and benefits, considering the impact on traditional fishing practices.

According to the fishermen, they use the entire coastal waters for active fishing, travel routes, and deploying different types of nets such as *ozhukkuvala* and *neettuvala*. These nets follow the natural sea flow and littoral currents. The construction activities related to the port have disrupted their usual fishing routines, reduced available fishing areas, destruction nets and resulted in substantial financial setbacks.

As previously mentioned, the traditional fishermen near Vizhinjam, Thiruvananthapuram, heavily rely on natural reefs (*paarukal*) along the coast for fishing. These reefs serve as important fish habitats and centers of biodiversity. Unfortunately, the dredging for the port has already covered many of these reefs with sand, negatively impacting both their livelihoods and the local coastal environment. This has led to job losses, especially among older fishermen who avoid venturing into deeper waters.

Some of the specific concerns raised by Vizhinjam fishers are:

- The coast and coastal waters in the vicinity of the upcoming Vizhinjam port are major fishing areas of traditional fishers including those using the *kattamaram* and *Kamabavala/Karamadi* (shore-seines). Dredging and reclamation, construction of breakwaters and movement of barges transporting stones from Muthalapozi harbour have caused large scale disturbance to fishing activity. Nearshore reefs (*paarukal*) on which traditional fishermen depend for fishing have disappeared completely or significantly damaged due to reclamation and dredging. **(See the details in the Chapter 6 above and Appendix A)**
- Fish that were common at this time of the year (May-June) are no longer present. Construction activities also damaged a significant shrimp ecosystem. They added that while construction on the Vizhinjam harbour was stopped during the 138-day protest, fish availability in the area was rather good.
- There are many people who worked in the mussel and clam sector who were left out from receiving compensation from the government. This is the result of a very narrow definition of the 'project area' in both the DPR and EIA. Consequently, women mussel vendors were left out of the compensation list. Many men mussel collectors were also sidelined though they were involved in the occupation, but resided outside the project area.

- Turbidity has increased due to dredging that affects fish abundance and health of mussels.
- On many occasions barges transporting stones from Muthalaphozhi harbour for breakwater construction have destroyed *ozhukku vala/neettu vala* (fishing nets) deployed in coastal waters. This has been particularly serious during the night, when siting the moving barges has been difficult, causing danger to the fishers as well.
- Many of the traditional fishers, especially *kattamaram* and *kambavala* fishers are no longer employed because of the loss of their fishing areas and fishery habitats.
- Decrease in income from fishing and non-availability of jobs in fishery related activities have forced many of the women of the coastal fishing villages to go as house maids and domestic helpers for survival. It is for the first time the women from the fishing communities are forced to serve as domestic helpers in other areas and houses for their livelihood and survival. These women face much difficulties, abuse, and social discrimination at the place of work. Despite all these they continue to work as domestic helpers to earn a living.
- Young people, many who were fishing, are also migrating abroad and other places from the coastal region in search of jobs as they cannot find decent employment in their areas. The current situation of highly reduced income from fishing has negatively affected the young peoples' perspectives on going back to fishing which was a reasonable and dignified source of independent livelihood.
- Many are forced to indulge in drug trade. Crime rates are increasing. These are all reflection of the current socio-economic and psychological situation in the area.
- It was also mentioned that 243 houses got damaged in the region because of the vibration created due to the impact of piling for construction activities. Out of the damaged houses 8 were destroyed. Only a very trivial compensation was paid.
- Another very crucial problem mentioned was relating to the increased turbulence at the mouth of the Vizhinjam fishing harbour due to the breakwater under construction. This fishing harbour was safe and used exclusively by traditional fishers where no major accidents were reported till the construction of the port got started. The depth at the mouth has decreased from 10 - 12 m to 5 - 6 m. This has been evidenced by actual depth measurements. In 2021, because of the newly constructed breakwater for the port and the turbidity in the sea at the mouth of the harbour and inside it as well, 11 boats were completely damaged along with the nets. The accidents caused loss of about Rs. 67 Lakhs.
- Due to accidents at the mouth of the harbour 5 fishermen lost their life. These were fishers from other villages. Three families from Poonthura received their insurances amounts of Rs 10 lakhs each. Some received Rs 2.0 lakhs for loss of their fishing boats.
- Wave action has increased within the harbour and many a times anchored boats within the harbour get damaged. The depth inside the harbour also decreased due to siltation.
- Sand is getting trapped at Valiya kadapuram area between the newly constructed breakwater of the Vizhinjam port and the south breakwater of Vizhinjam fishing harbour.
- Many restrictions are imposed by the port and Coast Guard for fishing off Valiya kadapuram and other normal fishing areas and boat routes.
- Traditional fishermen are forced to travel an extra 500 m due to the presence of the breakwater for going out and coming into the harbour which needs extra 5 litres of

kerosene. Presently the fishermen must spend a minimum of Rs.500/- for 5 litres of kerosene which, assuming a conservative 150 days of fishing yearly adds up to Rs. 75,000 per head. This is a huge amount which eats into whatever they earn.

- The promise of the government that it would give kerosene free of cost until the construction of the port is completed is still to be implemented.
- Compensation for loss of livelihood due to Vizhinjam port was mostly limited to those living in the hills and cliffs adjoining and east of the Vizhinjam port though the really affected group are the fishers whose fishing zone is the whole coastal waters off Vizhinjam. The really affected group of fishers are left out of appropriate compensation since only those who had houses in the land of the port estate area were considered for compensation.
- The people emphasized that only fishermen who utilized motorised boats received registration from the Department of Fisheries. Fishers who continue to use non-motorised crafts (mainly kattumarams) were not given registration and hence not counted for any compensation package. This is grave injustice.
- Among the fishers using non-motorised crafts there has been a drastic reduction in their source of income because of the of port construction, only a small number of traditional fishermen have received Rs. 5 Lakh from the government as compensation for the destruction of their livelihood. The list of those who have received compensation as compared to the actual total numbers is given below:

Type of Fishing	Total Number Listed by Govt.	Actual Number	Compensation Received per person
<i>Karamadi (Shore Seine)</i>	273	500	Rs. 5 Lakh
<i>Kattamaram</i>	53	800	Rs. 84,000/-
<i>Chippy thozhilali (Mussel gathering workers)</i>	345	Not available	Rs 5.6 lakhs

- Large number of ships that are expected to visit the port once the port become operational. This will cause damages to the nets deployed in the coastal waters for fishing. It will cause disturbance to normal fishing activities by interfering with the operations of boats, outboard engines, and non-motorised crafts. This was very evident when crew change facility was provided at Vizhinjam port.

The Kerala Maritime Board website reports that there were 735 crew change operations between July 2020 and July 2022. This means almost one ship every day. This indicates the extent of disruption to near shore fishing operations as reported by the fishers. Over 6000 crew members sign off and onto the vessels. The revenue generated from Port Dues, Outer Anchorage, Channel fee, Vehicle Entry and Tug Hire charges was is Rs. 9.35 crores. However, as of July 2022 this facility of outer anchorage crew change, which was permitted in Vizhinjam during the Covid-19 period, was withdrawn by the Director General of Shipping.

When the JPC members visited Kovalam beach (mid-June 2023) it was noticed that even before the monsoon gained force, a sizable portion of the famous Kovalam Hawa beach was already eroded. A researcher from IIT Chennai informed the members that concerns have been raised about the future of Kovalam beach as the port construction at Vizhinjam moves ahead.

Concerns and issues (Poonthura)

Fishers of Poonthura mentioned that they had been experiencing erosion of their beaches right from the time that the Vizhinjam Fishing Harbour was constructed (early 1970s). Seawalls were constructed to prevent the erosion. However they had a 60-70-meter-wide beach prior to 2015. Once the VISL construction started they have been experiencing further loss of their already shrinking beach. The community response was to ask for more seawall construction as protection for their houses even if this meant reduction in the space for beaching their crafts at their village.

- Many of the fishers have been increasing their dependance on fishing from Vizhinjam Fishing Harbour. This has resulted in greater costs and lower incomes. And risk of accidents too.
- Fishers also mentioned that following the dredging activities of the VISL a few of the natural reefs which they had been fishing over were covered with sand.
- Fishers explained that the Government had in 2022 experimented with the use of geo-tubes as an alternative to granite sea walls. However this experiment was largely a failure because the required number of tubes of the appropriate dimensions had not been deployed.
- Fishers made requests for more beach nourishment activities and strengthening of damaged groins.
- Some members of the JPS also pointed out to the fishers that geo-tubes may not be appropriate for rough and deep continental shelves like that of the Arabian Sea in the Thiruvanthapuram area.



Fig 7.1: A view of the Valiyathura village from the top of the pier.
Photo credit: TA Ameerudheen

Concerns and issues (Valiyathura and its immediate vicinity)

The erosion issues in Valiyathura were very extensive and damaging and with huge implication on the assets and livelihood of the fishers. After 2015, in this area about 300+ families had been shifted to relief camps (in schools and community centres and cement go-downs) following the sea swallowing their homes.

Some of those who have lost their homes have been rehabilitated in flats constructed by the Department of Fisheries under the Punergham Scheme. There have been many complaints about these apartments – the quality of construction, the services available and the fact that being away from the beach prevents the fishers from being able to observe the sea. Many youngsters have taken to drugs. Alcohol consumption levels have been risen since they have moved into the flats.

In places such as Kannanthura, Kochuthopu, Valiyathope and Cheriyaathura coastal erosion has destroyed houses and community facilities such as schools, dispensaries, and community halls. More than three rows of houses have been lost in sea erosion here in the last few years. **(See Chapter 7 below)** There was a time when local children played football on the beach. Now the whole area has been swallowed by the sea. Two anganwadis in the Kochuthope area were completely taken by the sea. The people said that proper impact study assessment was not done regarding the issues caused by the VISL construction.

The Valiyathura football ground has been partially damaged by the beach erosion. The village has produced some state level football (Santhosh Trophy) players in the past, who used to be trained here.

Now the fishers are forced to keep their crafts and gears at the remaining grounds due to the loss of their beaches where they kept their occupational belongings.

The locals highlighted other issues as well:

- The wells which provided fresh water have now become saline due to the ingress of salt water because of the beach erosion. This is a new phenomenon.
- With the increasing in the dredging at VISL, the pillars of the pier at Valiyathura are in danger. This phenomenon has never happened before the port construction.
- There are major health issues and privacy issues of those staying at relief camps. The camps are marked by poor ventilation, low clean water availability and unclean surrounding.
- As the fisher folk know only traditional methods of fishing it is very difficult for them to identify other employment opportunities.
- People feared that into the future, the pollution from the VISL would lead to greater loss of marine biodiversity and further jeopardise the lives of the fishers.

Later the JPS members visited the Valiyathura, Kannanthura and Shangumukham areas to see the impact of the port. It was a very shocking sight to see the complete beach and many rows of houses taken by the sea erosion. Shangumukham beach, which was one of the main tourist spots for the urban population, and the space for large public gatherings and religious festivals such as Vaavu Bali has been totally ruined. **(See Appendix C for a Photo Essay on Valiyathura)**



Fig 7.2: Shangumukham Beach Road in 2021 impacted by coastal erosion north of the VIS (Valiyathura Pier in the background)

Concerns and issues (Villages South of VISL)

The JPS members organized a meeting with the local fishermen of the regions of Poovar, Pulluvila, Puthiyathura, Adimalathura, Kollamcode which lie south of VISL. Unlike the villages north of VISL, these were areas which experienced accretion and were therefore not immediate victims of the erosion due to port construction. But there have been curbs in their fishing activities due to the port traffic at sea relating to the breakwater construction and the ships arriving for crew change mentioned above.

Box 6: Extract from the REIA

Development of Vizhinjam Port

C1021119

Rapid Environmental Assessment Report

RP010 rev.2

3.5 Sea Area Features

A broad summary of the important features is given hereunder

3.5.1 Fishing Zones

No significant fishing zones are reported in the immediate vicinity of the proposed Vizhinjam Port area

The Rapid EIA for the Port commissioned in 2004 states in its Section 3.5.1 that ***“No significant fishing zones are reported in the immediate vicinity of the proposed Vizhinjam Port area”***.

Could there is a bigger falsehood than this?

However, with the notification of a Port Economic Zone, the implications for their fishing activity were not considered either by the VISL or even adequately by the communities themselves.

A recent notice from the Poovar Coastal Police to the parish priest is evidence of the seriousness of the events ahead. It also gives credibility to the anxieties and fear of the fishing communities living near the port about their fragile future in fishing.

Poovar Coastal Police Station hereby informs the parish priest:

Whereas, you have been informed in writing by the Vizhinjam Fisheries Office and the Vizhinjam Port Office, that in the areas of the sea where the construction work of the Vizhinjam port is proceeding and along the shipping channel, fishworkers are not allowed to fish.

However it has been brought to our notice that the fishworkers from your parish have disregarded these orders and continue to fish in these notified areas. Also, the Port authorities have informed us over the phone that fishing is taking place in a manner which is obstructing the port work.

We therefore wish to inform the fishworkers that from now onwards, without any further notice, measures such as registering a case will be taken by the Vizhinjam Coastal Police.

Sincerely

Inspector of Police
Coastal Police Station
Poovar
Dated; 23 January 2023.

Fig 7.3 Notice from Coastal Police – Translated from the Malayalam notice

A woman community organiser from the area said that according to a recent survey they had conducted; it was estimated that about 27,000 fishermen from Adimalathura to Kollamcode area, and around 5000 women will lose their fishery related employment after the port construction. They said that their livelihood depends on the sea and most people earn their daily wages from fish-related activities. The construction of the port has already reduced the availability of fishes. Once the port becomes functional, the curb on fishing activities will have a major impact on livelihoods. The issues that the local community pointed out are given village-wise below:

Adimalathura

- The people said as the sea wall to be built around the port operations will result in fishing becoming impossible in the area using traditional fishing methods like *Kambavala*, *Thattumadi* etc.
- The huge ships while parking at the port shipping channel will spill marine diesel oil which will in turn cause pollution and affect the fishing habitat.
- Those who operate in the near shore waters will be the first to lose their occupation.
- Many natural reefs have already been destroyed as they have come within the port area. **(See Chapter 6 and Appendix A)**
- There are few natural reefs which will become out of bounds as they will become part of the shipping channel zone which will be a 'no go' territory for fishers
- Accepting the meagre compensation provided (Rs. 5.6 lakhs) has meant giving up all benefits and welfare measures from the Kerala State Fishermen Welfare Board. This implication was not explained to them.

Puthiyathura

- As part of marking borders of the Port Economic Zone for VISL, the shipping channels will be 'no go' zones and so the additional travel time needed to get to their fishing grounds will require an extra travel time which will cost more fuel. Most fishers will also lose their customary fishing territories in the near shore waters.
- As the port continues its construction the local people from the region would be completely evacuated, this fear is already part of the community discussions.
- There are few natural reefs which will become out of bounds.

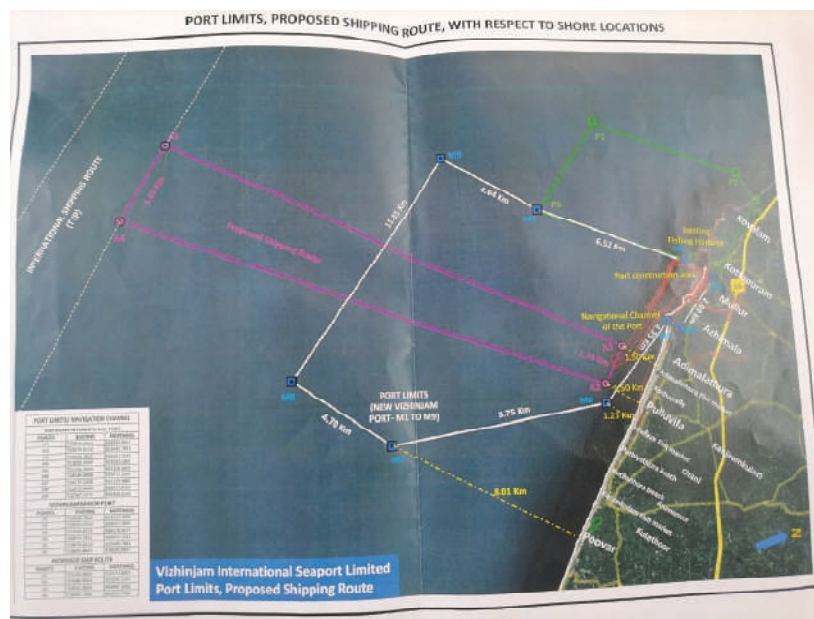


Fig 7.4: Port Limits, Shipping Channel

Pallom

- Fishing cannot be done by traditional fisher folk as the port construction continues.
- Many of the fishing nets may get damaged because the large ships crossing over them.
- Once the large ships come to port area, the waste dumped from the ships will make the sea polluted, destroying many nearshore habitats and fishing grounds.
- The crime rates in the region will increase as young men and adolescents would indulge in illegal drug business to survive, due to the highly risky, but good earning.
- The traditional fisherfolk who operate in the near shore waters will be the first to lose their occupation.

Pulluvila

- The continuous passing of ships will cause accidents, fishing nets and boats too will be damaged.
- Since the area will be declared as Economic Zones, the entry to the sea for fisher folk will be completely blocked.

- Poverty will increase in the fishing community due to the lack of employment and loss of income due to the scarcity of fishes at sea.
- The rights under the Kerala Land Reforms Act of 1969 (Kudikidappu rights) have not been granted to fishers. The result is that they can be evicted without any process. This is a major concern and will lead to serious dispossession.

Later women representatives from Coastal Watch (an NGO) spoke about the problems faced by women at the coastal community as their husbands become unemployed.

- The rates of alcohol addicts would increase and issues relating to this would increase to an alarming state.
- Domestic violence would increase in the coastal belt as husbands would start showing frustrations towards the family members.
- Fish vending women would be unemployed; women would start doing jobs like domestic helpers which might be tiring for them. The solace is that they may manage to get a daily wage.
- The reduced fish landings have already increased the burden of the fish vending women who are not able to compete with male merchants in their own villages. They are forced to travel to the wholesale markets and harbours to buy fish. This adds to the labour time and costs.

The views and apprehensions expressed by the fishing communities both to the north and the south of the VISL population are not found in any of the environment or socio-economic assessments which were commissioned either before or after the commencement of the project. This probably points to the lack of **free, prior, and informed consent** which is both a right of the 'affected' communities and a duty of the government and the investors.

Evidence Clearly Supporting the Fishers' Apprehensions and Concerns

There is some evidence provided by the Compliance Advisor Ombudsman (CAO) of the International Finance Corporation (IFC) which strengthens the fishers' general sentiment about inadequate consultation and addressing of issues relating to the negative externalities imposed on them by the VISL construction and possible future impacts¹⁵.

The IFC was not associated with the agreement between VISL and Adani Ports. However, the fact is that much data and analysis and market studies and impact assessments made by them in 2010 subsequently influenced the DPRs and EIA made in 2013. Moreover, IFC being an affiliate of the World Bank is subject to much higher standards and protocols for their assessments. The private agencies, which were involved later, were not subject to such oversight by any independent ombudsman as IFC.

¹⁵ For the full details see <https://www.cao-ombudsman.org/cases/india-vizhinjam-01kerala>

In August 2012, a complaint was filed to the CAO by local tourism workers/businesses and other residents with the support of the Kerala branch of Exnora International, the Kerala Hotels and Restaurants Association, and the People's Resistance Committee in Vizhinjam.

The complainants raised concerns about detrimental impact of the port project on tourism and fishing communities situated along the coast of the area. The impacts cited in the complaint include, but are not limited to, water scarcity, loss of livelihood, loss of land and inadequate compensation. Also, the complainants specifically question IFC's due diligence and contended that IFC failed to undertake a thorough review of documentation on the project's environmental, social, and economic impact assessments.

CAO completed its joint compliance investigation in January 2018.

The compliance investigation report makes two broad non-compliance findings in relation to IFC's involvement in the project:

1. IFC took on the role of lead transaction advisor in relation to the Vizhinjam Port project without a reasonable assurance of the client's (VISL) commitment to develop the project in accordance with the Performance Standards; and
2. The Environmental and Social Impact Assessment (ESIA) as delivered by IFC was not fully consistent with the Performance Standards, particularly in relation to land acquisition and project impacts on livelihoods.

CAO's compliance investigation report further makes several specific findings regarding IFC Advisory Services which pointed to shortcomings of the part of IFC staff and IFC negotiations with VISL.

One of the key observations of the CAO, which is of relevance to the issues raised by the fishers are the following:

That IFC agreed with the VISL for narrowing of its environmental and social (E&S) mandate over the period of the project, such that IFC finally oversaw only one component of the project ESIA—an assessment of marine-side port facilities that excluded land-based infrastructure such as road, rail and back-up facilities. This change of scope meant that IFC did not have assurance that impacts on land or cumulative impacts arising from the project were being addressed in accordance with IFC's E&S requirements.

And further that:

This restricted marine-side ESIA delivered by IFC to its client lacked certain essential components of an ESIA for a major infrastructure project at the relevant stage of development.

CAO finds that the IFC ESIA lacked adequate socio-economic baseline information on tourism-based livelihoods, an assessment of project impacts on tourism-based livelihoods and livelihood

restoration plans for project impacts on tourism and fisheries as required by the IFC performance standards for risk management and land resettlement.

CAO also finds that the IFC ESIA did not go through a process of consultation and participation, or disclosure as required by standards.

It is for the VISL to prove to the fishers that, when they conducted the subsequent EIA for the current project agreement, they did rectify the serious shortcomings pointed out by the CAO of IFC.

In Conclusion

As Madhav Gadgil and others have recently observed (Gadgil et al 2023):

One may assign people to three broad categories from an ecological perspective. Ecosystem people meet the bulk of their resource requirements from a limited area near their habitation through gathering or low-input agriculture and animal husbandry. Biosphere people enjoy access to resources garnered from the entire biosphere and made available through markets, while ecological refugees are people that have lost access to their traditional base of natural resources yet have very limited access to resources through markets. In India today the ever-growing pressure of biosphere people is converting an increasingly large proportion of ecosystem people into ecological refugees.

What we are witnessing in Vizhinjam is a specific case of the above process.

8.VISL and homes lost to erosion

The Ministry of Earth Sciences published an extensive 'National Assessment of Shoreline changes along Indian Coast: Status report for 26 years (1990 – 2016) in 2018. The Introduction to the Report highlights what are considered the main anthropogenic causes for coastal erosion (Kankara RS et al 2018):

*Human influence, particularly urbanization and economic activities, in the coastal zone has turned coastal erosion into a problem of growing intensity. Anthropological effects that trigger shoreline changes are: **construction of coastal structures**, mining of beach sand, offshore dredging and damming of rivers. Human intervention can alter the natural processes through the following actions:*

- *Dredging of tidal entrances and navigational channels*
- *Construction of harbours and coastal structures such as groins and jetties*
- *River water regulation works such as damming*
- *Hardening of shorelines with seawalls*
- *Beach nourishment*
- *Destruction of mangroves and other natural buffers*
- *Beach sand mining*

The extensive coastal erosion which we are witnessing in Thiruvananthapuram District due to the deadly combination of many of the above-mentioned features.

The most visible impacts which have befallen the fishing communities of Thiruvananthapuram District after the commencement of the port construction in 2015 has been the enormous increase in the beach erosion and the consequent loss of their houses.

The matter was raised by the fishers themselves and by the church authorities to all those responsible. One of the responses of the LDF government in 2017 was to get the Department of Fisheries to undertake a study to assess the details of the houses of fisherfolk which were constructed less than 50 metres from the High Tide Line across the whole State. This distance is perhaps the closest one can get to being permanently at the mercy of Nature and any human interventions which go to exacerbate that impact.

The Report of this study (Govt of Kerala, 2019) reveals some very disturbing facts about the extreme physical vulnerability of the fishing communities which can take place because of even small changes in the normal wave conditions prevalent in their villages. The Preface of the Report highlights:

The natural hazards, including the increasing problems of coastal erosion, high power tides, cyclones the climate change induced risks, especially, floods, tsunami, sea-wave formations, etc, seriously impact the livelihoods of the coastal communities in the State.

Persistent sea surge and coastal erosion has resulted in the loss of life and property of the coastal fisher population who are one of the most downtrodden communities of the State. One of the most apparent losses of property is the damages that come about to the dwelling spaces of the fisher population. Every year hundreds of houses are damaged due to the fury of the sea forcing these poor families to shift to temporary shelters, many of whom have been stuck there for several years disrupting their normal livelihood and affecting their socio-economic and cultural status. (Govt of Kerala 2019)



Fig 8.1: Fishers who lost their homes now staying in temporary structures Credit: The News Minute

The statistics in the Report reveal that of the 18685 houses of fisherfolk in Kerala which are within 50 metres of the HTL along the 590 km of coastline, as many as 3339 (18 %) of the houses are in Thiruvananthapuram District which accounts for 13 % of the coastline. Of these houses, as many as 48 percent (1615) are in the 9 villages¹⁶ which are north of the VISL construction that have been unduly affected by erosion post-2015 and as many as a third of the houses (415) are precariously within 10 metres of the HTL. It is important to note that of the 1615 houses, as many as 1473 – or 90 percent at brick-and-mortar structures, built after investing a substantial sum of money and have become homes to which the owners are emotionally attached.

¹⁶ JPS study covers only 7 villages



8.2: Homes within 10 metres of the HTL Credit: T.A. Ameerudheen.



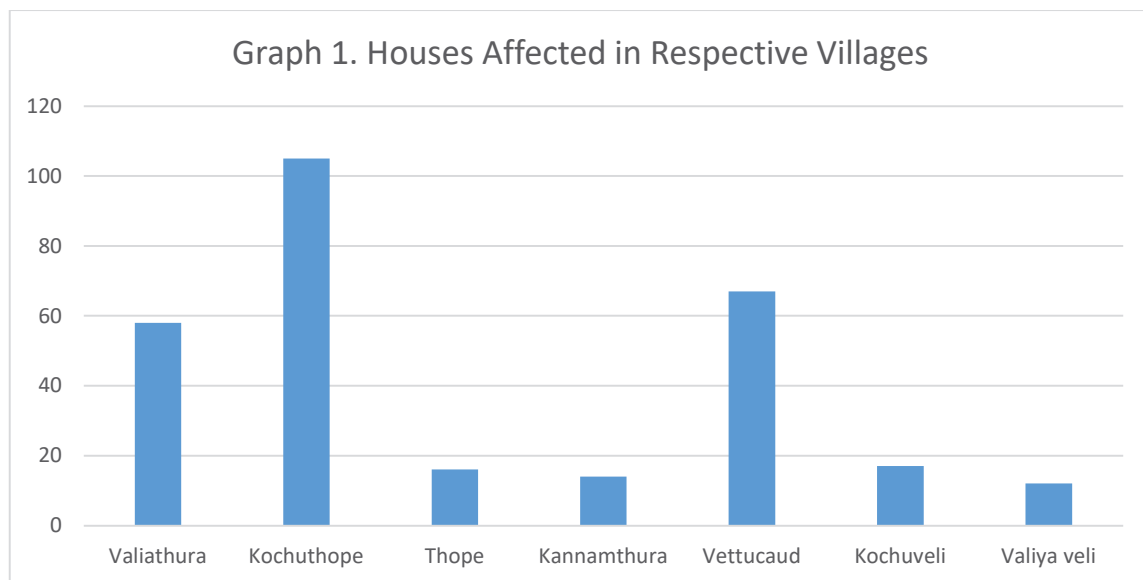
Fig 8.3: Shangumukham Beach Road to the Trivandrum International Airport destroyed by the waves.
File photo: Manorama

Homes lost to the sea after start of VISL port construction

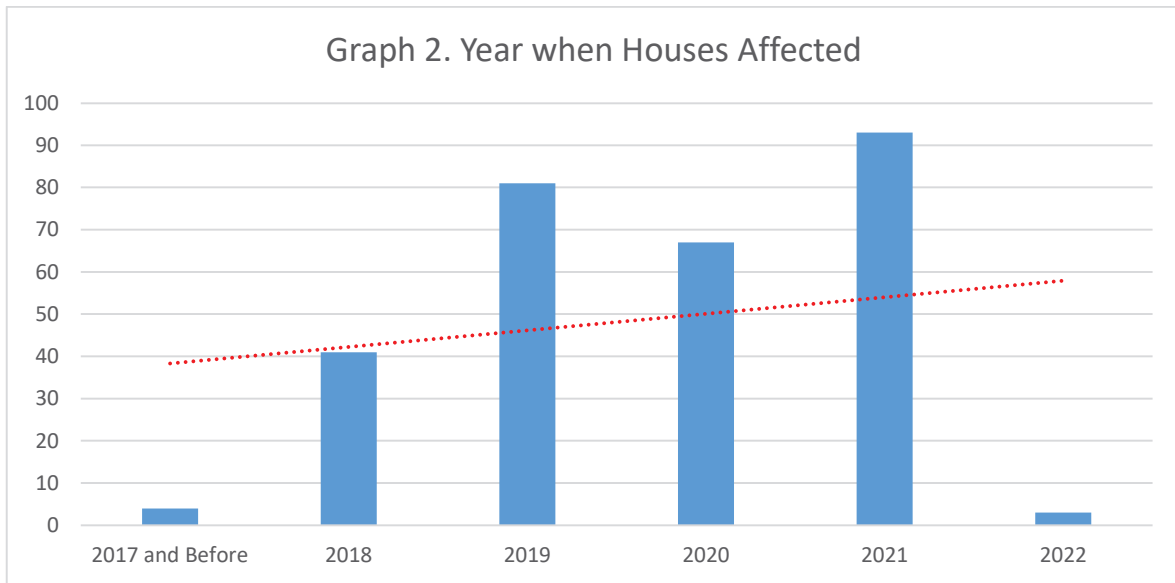
The JPS wanted to obtain a real picture of loss/damages to houses along the affected coastal sectors after the construction of the Vizhinjam port got started. The objective was to understand the impact of coastal erosion, coastal flooding and wave overtopping after port construction was initiated. The study was conducted by local experts with the help of the members of the JPS and other experts from the field. Data was collected by local volunteers by interviewing all the 289 persons, living in villages north of the VISL, who have lost their homes to the sea after 2015. A short questionnaire (Google Form) was used.

The results are presented in the form of 7 data representations which reveal important relationships between the port construction, erosion, and its impact on houses on the coast.

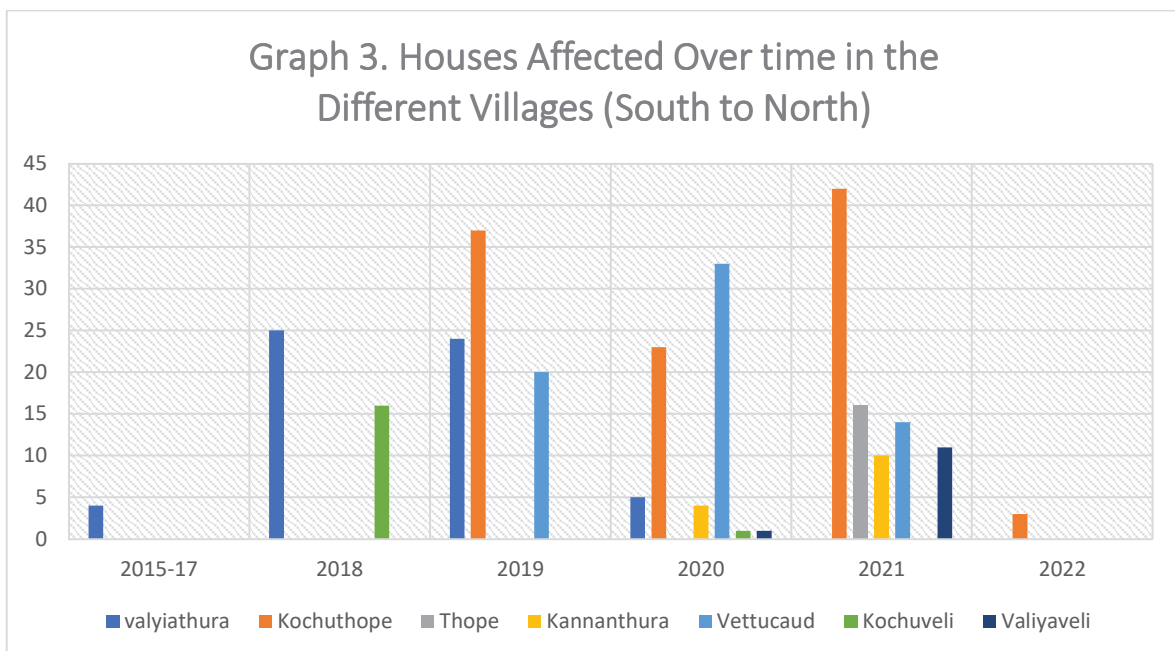
IMPORTANT ASPECTS REGARDING THE 289 HOUSES AFFECTED BY EXTREME SEA EVENTS ALONG THE SEVEN VILLAGES OF TRIVANDRUM COAST BETWEEN 2015 AND 2022



As many as 289 houses in these seven villages were swallowed by the sea post-2015 following the start of VISL port construction (Graph 1)



Prior to 2015, erosion was importantly known to affect mainly the village of Valiyathura. The number of houses lost was also not many. However, as the port construction proceeds, the number of houses affected also increases. (Graph 2)



What is more pertinent to note is that it is not only that the total houses affected increases, but it is more significant that over the years, as the construction of the port proceeds, the villages which are further away (northwards) experience erosion and the houses there are affected. (Graph 3)

Box 7: "Littleflower's Resilience"

Nestled in the fishing village of Kochuthope, situated parallel to the Thiruvananthapuram Domestic Airport, Littleflower's life was once a serene tale of simplicity. Her home, close to the sea, was her sanctuary, where she, her husband, elderly mother, and two daughters found contentment.

This place held our dreams.

Littleflower's family had a profound connection to this home; it was where her mother was born and raised, and it had been their family's haven for generations. For half a century, they had earned their livelihood from the sea just a stone's throw away. Littleflower, after marrying a fisherman, saw no reason to leave this precious piece of land, a place her husband could easily access the sea.

"This house was just one room back then," Littleflower began, her voice tinged with nostalgia. "Ten years ago, my husband and I decided it needed a makeover. Our daughters were growing, and we wanted to provide them with more comfort and privacy. We used our savings and the 2.5 lakh rupees from fisheries. The total cost was around 17.5 lakh rupees, and we borrowed the rest by pledging gold and taking loans. We're still repaying some of that debt."

Littleflower's husband, a dedicated fisherman, joined the construction efforts. He, too, tirelessly contributed to the renovation after long days at sea. Littleflower herself, amid managing the household and looking after her children, lent a helping hand in building their dream home.

In 2013, the house was transformed into a new home. Littleflower remembered it vividly, there were two rows of houses standing in front of theirs on the seafront. However, the sea, once their lifeline, had become unpredictable after 2015. Storm surges and coastal erosion started to haunt their dreams.

The sea became our relentless adversary.

"We didn't have any issues with rising sea levels or storm surges before this house was built in 2013. We never thought it would be washed away. We could not imagine leaving this place or affording land elsewhere. We lived off the sea; it was our sole income. This house was a testament to our hard work. We poured our sweat and blood into it."

Their eldest daughter was ten years old, and the youngest was seven when the house was completed. Unfortunately, the older daughter faced mental challenges, and the fear of the encroaching sea began to affect her deeply. In 2017, the sea invaded their home for the first time. Walls crumbled, seawater filled their kitchen, and the neighbouring houses had already succumbed to the waves.

Despair washed over our lives.

As the years passed, their fears escalated. The sound of waves at night became an agonizing lullaby. During the monsoons, their entire village, including Littleflower and her husband, took refuge in the churchyard or roadsides, unable to sleep peacefully due to the looming threat of the sea.

"We were homeless, and people saw it, but months before losing our home, we began losing sleep. We accepted that our house and belongings might be swallowed by the sea. Some folks moved their belongings to relatives' houses. I moved some furniture, but we lost a big dining table, chairs, and a TV. But I did not mind; this house, built with a lifetime savings, almost was gone. I cried daily, begging God to protect it, but the sea took it. We became refugees."

In 2017, they sought shelter at St. Anne's School after losing their home. The lack of privacy there exacerbated their eldest daughter's mental health issues. They eventually moved back to their battered home by the sea, as the options grew limited.

We clung to the remnants of our dreams.

Time marched on, and they moved to rented houses, one after another, until tragedy struck once more. Littleflower's husband, seemingly healthy, suffered a fatal heart attack while at sea. Financially strained and emotionally shattered, Littleflower, along with her children and elderly mother, returned to their dilapidated home, half swallowed by the sea.

Life had dealt us a harsh blow.

Littleflower had hoped for government support following the Vizhinjam struggle, but promises remained unfulfilled. The assurance of rent assistance never materialized. Their lives depended on ration shop rice and neighborly goodwill.

Desperation cast a long shadow.

Littleflower's dreams of rebuilding her life with her own means began to fade. She wondered whether any government-provided house or flat could ever replace the dreams woven into their home. The choice between Punargeham Flats, with their mixed reviews, and an uncertain future loomed large.

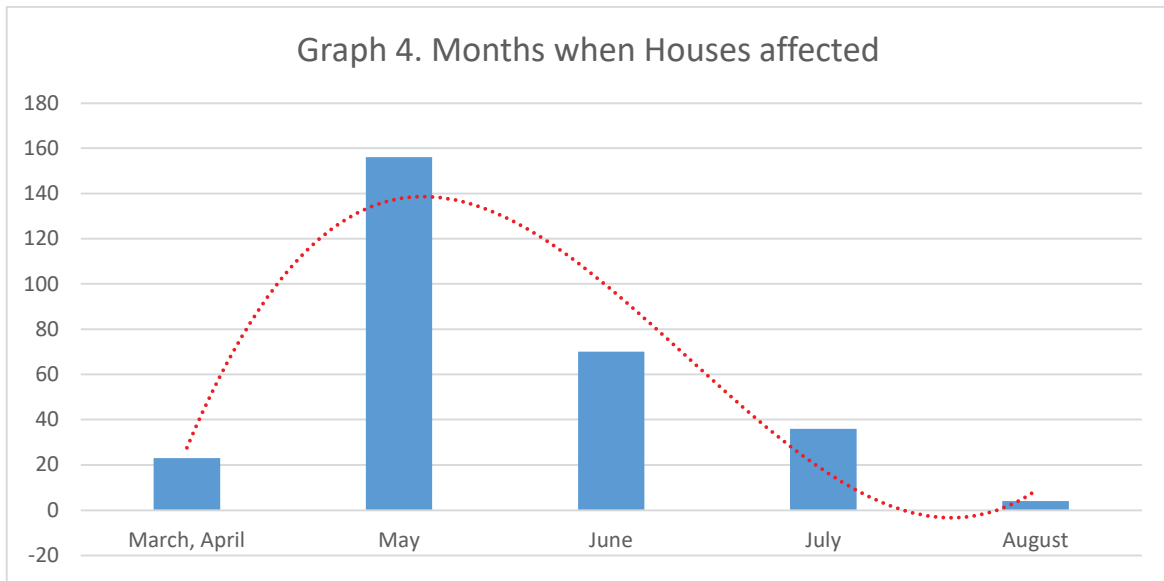
How much longer must we wait?

Littleflower's plea was for answers, for a glimmer of hope to end her family's suffering. The uncertainty of the future weighed heavily, a constant reminder of their ongoing battle against the relentless sea.

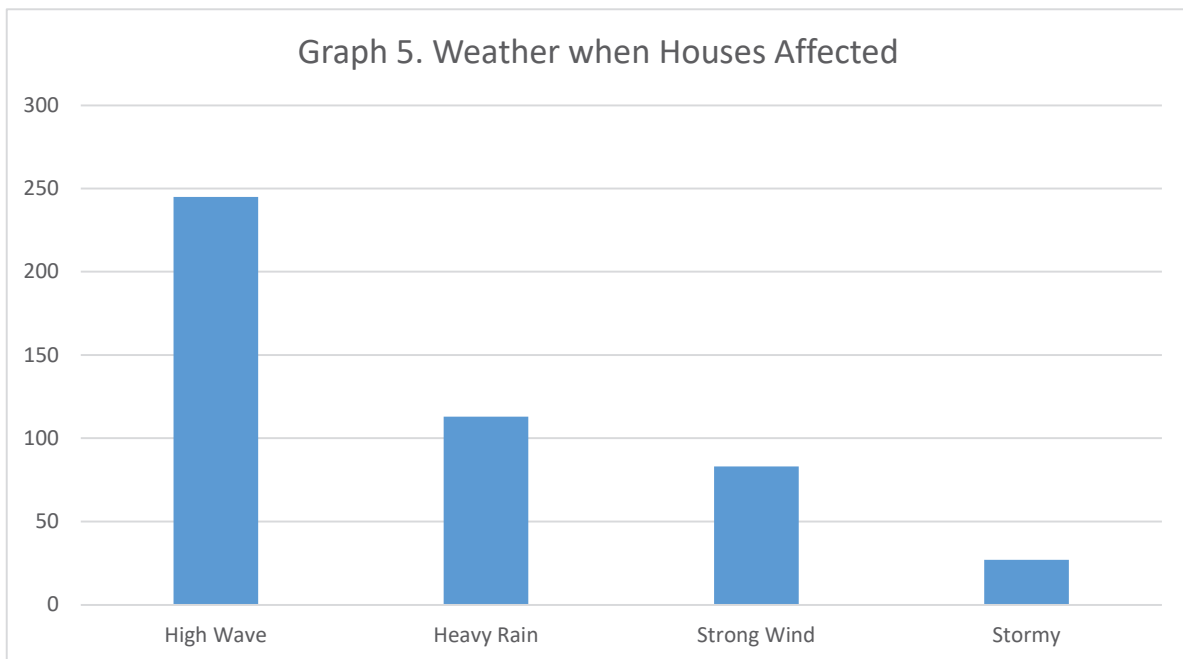
How many more years must we endure this uncertainty?

As narrated to Sindhu Napoleon

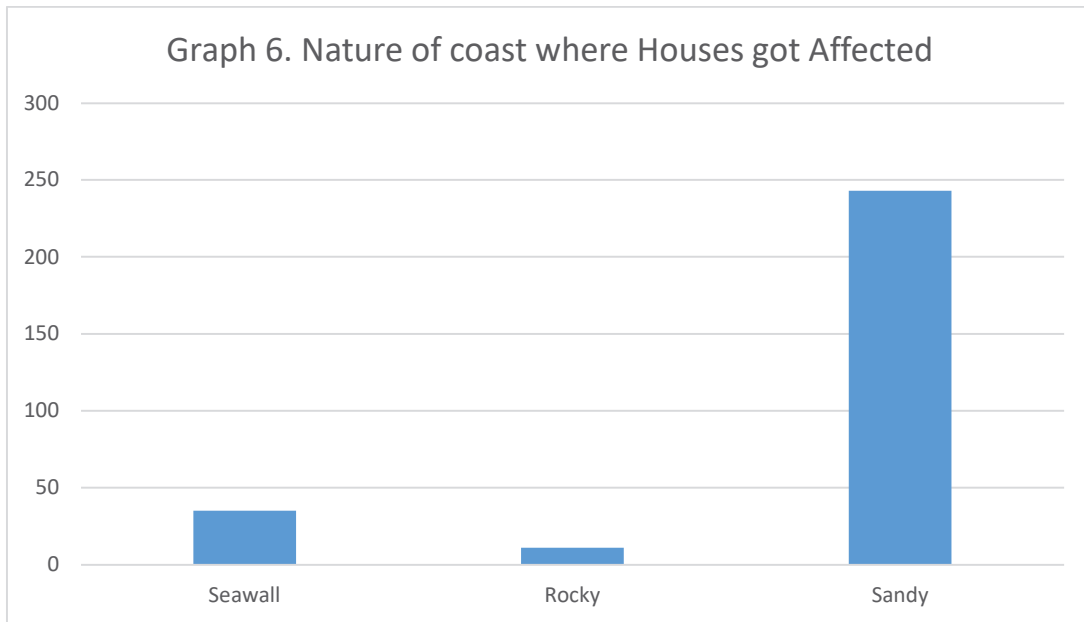
September 2023



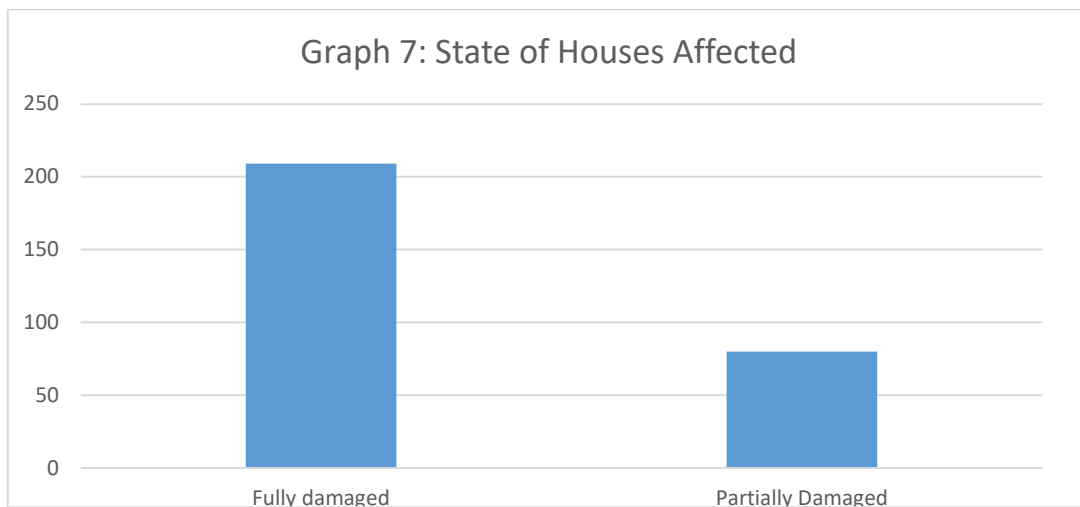
It is also amply clear that it is during the monsoon months, which cause storm surges and erode the coasts, and not during the times of cyclones such as Ockhi, in the periods after August, that houses are washed away by the sea. (Graph 4)



The prime weather condition when the houses were affected is the high wave conditions and not so much the strong wind. This points to the possibility of hydro-dynamics caused by littoral currents being altered by built structures. (Graph 5)



The presence of seawalls is a sign of erosion in the villages prior to 2015. However, the houses affected after 2015 are mostly in villages where the beach is sandy. This indicates that the erosion (post 2015) is taking place in villages where the harmful effects of erosion are indeed new! (Graph 6)



The ferocity of the erosion is evident from the fact that the houses are fully damaged and beyond repair. In fact, in many cases, they have been indeed been swallowed by the sea. (Graph 7)

In conclusion

The intricate interplay between human activities and the natural environment is starkly illustrated by the escalating issue of coastal erosion along the Indian coastline, as exemplified by the distressing situation in Thiruvananthapuram District.

The initiation of the Vizhinjam port construction in 2015 has further intensified this problem, leading to the heartbreaking loss of homes within coastal communities. The in-depth study conducted by local volunteers, as highlighted through Figures 1 to 7, reveals a concerning pattern where erosion expands progressively with port construction.

These findings emphasize the importance of informed decision-making that balances development with environmental preservation to safeguard not only homes but also the cultural and socioeconomic fabric of these vulnerable communities. It is imperative that sustainable strategies are devised to mitigate the impacts of coastal erosion and secure the well-being of those living at the intersection of nature and what is being touted as ‘development progress.’ People should not become victims of the process called “accumulation by dispossession’.



Fig 8.4: The pain of losing a home

Credit: Ayyappan R

"Shores of Dreams and Despair"

In coastal homes where dreams once thrived,
The sea now claims with each high tide.
They blame climate change, so easy to say,
But a port's breakwater took dreams away.

The women, strong pillars of their kin,
Their lives disrupted, hearts deep within.
They built their homes with love and care,
Through husbands' toil, a life they'd share.

Overnight, it vanished, their hopes now fade,
Frustration, anger, against the tide they wade.
Authorities pressed for the port's grand plan,
Ignoring the pleas of the fishermen clan.

Left with nothing, but hope's gentle plea,
That Mother Sea, their saviour, will be.
Amid the loss, they find their way,
Resilient hearts, facing a brand-new day.

A Passionate Supporter

9. Human Rights and remedial measures¹⁷

The displacement of fishing communities in the pursuit of development, such as the construction of this Vizhinjam container port, raises crucial ethical and human rights concerns.

This contentious issue often unfolds due to inadequate consultation with the affected communities, leading to a range of adverse consequences. Among these are severe beach erosion, the destruction of homes, and the potential loss of their cultural and livelihood practices.

The fundamental question that emerges is whether these actions constitute a violation of the basic human rights of these fishing communities, even as they are settling for remedial measures when faced with a *fait accompli* resulting from their limited social and political power in the face to the steam-rolling neo-liberal policies of both the Central and State governments.

Numerous international provisions exist to safeguard the rights and well-being of vulnerable populations, including those affected by such development projects. One of the key frameworks that come into play is the Universal Declaration of Human Rights, adopted by the United Nations in 1948. Article 17 of this declaration recognizes the right to property, and any forced evictions or displacements without just cause or due process could be seen as violations of this provision. Furthermore, the International Covenant on Economic, Social and Cultural Rights (ICESCR) delineates the entitlement to suitable housing, nourishment, and employment, which may come into play when these communities are displaced from their residences and customary means of sustenance.

Moreover, the United Nations Declaration on the Rights of Indigenous Peoples, which emphasizes the rights of indigenous communities, including their right to self-determination, culture, and land, can be invoked in cases where fishing communities are predominantly indigenous. The United Nations Sustainable Development Goals (SDGs), particularly Goal 14 focused on life below water, underscores the importance of protecting the rights and livelihoods of coastal communities. Additionally the FAO Small Scale Fisheries Guidelines, particularly Article 6.7 also adopts a human rights approach in calling upon states to protect the access of fishers to their customary resources and ensure their non-discriminatory policies.

The displacement of fishing communities for the development of this container port can indeed be viewed as a potential infringement on their basic human rights, as enshrined in various international agreements and declarations. These violations underscore the need for a more comprehensive and rights-based approach to development planning that actively involves and respects the interests of affected communities.

¹⁷ The contribution of Johnson Jament towards this chapter is greatly appreciated, particularly for the data gathered.

Short Term Remedial Measures

While we remain acutely conscious of the human rights issues, there are numerous immediate and short-term remedial measures which need to be considered about the negative externalities which have resulted from the construction activities of VISL. Given the varying negative impacts on fishing communities in different regions within the zone of influence of the port, we divide the region into three: The villages located north of the port; the villages within the port jurisdiction; and the villages located south of the port.

Villages Located North of the Port

The most important remedial measure which requires immediate attention is housing for families who have been affected by beach erosion (**See Chapter 8 above**).

Erosion and Loss of Homes: We have made estimates of the land lost in each of the villages from the data which was collected as part of the JPS survey of the 289 persons whose houses were affected by the erosion between 2015 and 2022. The details are given below:

Table 3: Land Lost Due to Erosion	
Village	Land Around Houses Lost to erosion (Cents)
Valiyathura	139.4
Kochuthopu	258.0
Thope	52.5
Kannanthura	45.5
Vettukad	189.75
Kochuveli	59.0
Valiaveli	43.5
Total Land Lost in Villages	787.65 (790)
Source: JPS Survey	

Assuming the cost of land today (2023) in these areas, which are in the vicinity of Trivandrum City, at average market prices is Rs. 8 lakhs per cent, then the range of the total cost of land will be (790x8) which is Rs. 6320 lakhs

The number of houses fully damaged was 209 and 80 were partially damaged.

The market price for house construction in the urban heart of Thiruvananthapuram city is about Rs 10 lakhs.

Hence the total cost for construction will be (289x10) which is Rs 2890 Lakhs.

Therefore, a modest estimate of the investment required today for rehabilitation (land and house) will be about Rs 6320 + Rs 2890 = **Rs 9210 lakhs or Rs 92 crores.**

The most important perspectives which needs to be kept in mind is to ensure that rehabilitation must be on land which is close to the sea and that the we must think in terms of 'designed villages' and not poorly constructed flats built without common facilities which are located far away from the sea. **(See Appendix – C for the full details on how this can be realistically achieved)**

Erosion and Livelihoods: A second adverse impact in these villages has been the shrinking space on the beach due to the erosion caused by the port. This has important bearing on their fishing activity. Fishers are unable to keep their boats on the beach for fear of damage. The option of using the Vizhinjam fishing harbour is ruled out since they are only allowed to use the Vizhinjam harbour during the monsoon months or during weather emergencies. This implies that a significant number of fishers – particular the younger among them -- must travel with their crafts and gear to villages further northern within Thiruvananthapuram district if they are to earn a livelihood. They bear the burden of extra travelling and transportation costs which need to be compensated. A fund for livelihood restoration and rehabilitation assistance provided by the port authorities which is managed by the Matsya Bhavans in the northern zone of influence of the port should be created to address this issue.

Villages within the Port Jurisdiction

In this realm there are several measures which need immediate attention. It is significant to note that the compensation measures which were addressed by the port authorities were largely related to their estimates of loss of employment in fishing. However, there have been several unexpected risks and hazards which have been inflicted on the fishing community during the years of construction of the port. These included issues of consequence on the village land and in the coastal waters within the zone of the port.

Damage to Homes: Most significant on land has been the houses which were damaged because of the tremors caused during the deep piling work at the port.

The estimate is that 243 houses got damaged in the VISL region because of the vibration created due to the impact of piling for construction activities. 15 houses had major damages. Two became non-usable, three had their roofs damaged. Out of the damaged houses 8 were renovated by the residents themselves. According to the photo documentation of the damaged houses, 30 of them had more than 10 cracks which would cost over Rs 6.20 lakhs to repair. One hundred houses had between 5 and 9 cracks. The rest had less than 5 cracks.

If we consider a total compensation package for these 243 houses at Rs 10 lakhs per house it will be Rs 2430 lakhs or **Rs 24.3 Crores**

Damage to Fishing Equipment and Loss of Life: Then there are the unforeseen impacts experienced by fishers of Vizhinjam during the extended construction include very frequent loss

of fishing gear which is entangled in the equipment and construction materials which are erected in the near shore waters. Another totally unexpected impact has been the loss of life and crafts in Vizhinjam as fishers enter and exit the fishing harbour due to shifting sediment dynamics and the unpredictable altered behaviour of waves as the construction of the breakwater proceeds. **(See Chapter 5 above)**. These are liabilities for which the Port should create a corpus from which immediate payments can be made to the affected fishers following a quick and effective inquiry. The equipment should be immediately replaced with new ones and loss of life in the vicinity of the fishing harbour should be compensated with a payment of **Rs. 50 lakhs** since this is a direct consequence of the alteration of nature processes due to the presence of the port.

Loss of employment: There is the loss of employment in fishing for the fishers within the zone of the port. They have been divided into two categories – those who lose their employment permanently such as the mussel collectors, and those who lose their employment opportunities partially such as the shore seine owners and workers and kattumaram operators. These compensations have been partially addressed by the port authorities. The data available indicates that at the end of December 2021 a sum of **Rs 93 crores** had already been paid out to 2396 beneficiaries related to the fisheries sector.

However, there are credible complaints that many have been left out of the outright compensation package.

As an example, there are 246 kattumaram owners who are composed of the older fishers. Of these only 53 have received a paltry compensation of Rs 82,440/person. If the remaining are to be paid at least Rs 1 lakh per head, the additional liability will be about **Rs 2 crores**.

There is need for an immediate reassessment of the compensation packages and the liabilities which need to be taken on by the port authorities in keeping with their obligations.

Loss of Cultural and Religious Spaces: Within the realm of the Vizhinjam village as many as three large playgrounds have been lost as they come within the jurisdiction of the port. Also, the St. Antony's shrine – and area of 1.5 acres – is in the process of acquisition by the port authorities and there is ambiguity about the compensation package for the same.

The issues need to be attended to immediately and appropriate compensation needs to be worked out after proper discussions with the community and its representatives.

Environmental Damage: The port construction has also led to unanticipated environmental damage due to stoppage or slowing down of the flow of rivulets (*thoddu*) because of the sedimentation between the port breakwater and the fishing harbour. This has resulted in accumulation of waste resulting in unanticipated health problems. Similarly, these are reports of frequent flooding in Marian Nagar after the port construction due to the sedimentation in the Valiyakadappuram.

There is need for an Environmental Management Fund which should be created as part of the regular financing of the port since this is a negative externality which will also affect its own operations.

Villages Located South of the Port

The villages situated in the immediate south of the upcoming port face a different set of issues. Though their immediate present does not seem threatened, there is a Damocles sword above their heads as they face the future.

The mirage of accretion: The fishers in the 9 villages south of the port do not face the threat of erosion as do their compatriots in the north. In the south, the beaches accreted substantially and there is more than adequate space for parking fishing boats, drying both nets and fish. There is even new space for sports such as football and other cultural and religious activities. This accretion started originally because of the Vizhinjam fishing harbour from the 1970s. The further increase in the last five years is the result of the Vizhinjam port construction.

Victims of Falsehood: While there are mixed reactions to the accretion process and the creation of 'new land' these communities are the victims of the erroneous and doctored Environmental Impact Assessments in which they had no participation. As we had pointed out in Chapter 7 above, despite the historical presence of fishing communities in the immediate neighbourhood of the port, the Rapid Environmental Impact Assessment for the Vizhinjam port, states with no ambiguity: **"No significant fishing zones are reported in the immediate vicinity of the Vizhinjam Port"**. This statement underscores the audacious inaccuracies upon which the development of the Vizhinjam port and its prospective activities are founded. This discrepancy is cause for concern and raises questions about the transparency and accuracy of the information presented in the past and present. It also supports the serious doubts which fishing communities have regarding the credibility of promises made by port authorities about the future.

The reality is that these fishing communities' dwell in some of the most densely populated villages in the country. Coastal wards of the panchayats can have population densities of as high as 12,000 to 13,000 persons/sq. km. If only the fishing habitations are considered, then the density increases many-fold.

Table 4: Population and Occupational Details of Fishers in the Villages South of the VISL						
Parish	Families	Members	Active Fisher men	Active Fisher women	Fishing Related workers	Beach business people
1. Kollamcode	1850	8050	1350	210	75	50
2. Paruthiyur	2100	9500	1500	300	100	60
3. Poovar	1500	6500	900	282	65	33
4. Karumkulam	1238	5547	950	350	75	50
5. Kochuthura	450	2150	675	73	27	15
6. Puthiyathura	2400	8400	1900	200	120	100
7. Pallom	650	2790	400	200	151	45
8. Pulluvila	3221	16000	1500	1100	200	120
9. Adimalathura	2003	10000	1840	991	75	25
Total	15412	68937	11015	3706	888	498
Total fishworkers			16107			
Source: Data from Respective Parishes						

The Table above gives the population and occupational data of the 9 villages south of the port. It is these fishing families which face the threat of various degrees of temporary and permanent loss of fishing employment as the port activities expand. The implication of this has not been factored into any compensation packages either of the port or that of the government.

If the future expansion of the port operations materializes as per the plans, it is likely that a large area of land will be declared as a special economic zone and the contiguous sea area will be, regularly or permanently, declared off-limits for the fishers. The clear demarcation of the shipping channels has not been completed and most fishers are in the dark about it. The absence of credible information exchange, and the resulting suspense within the affected population, contribute significantly to their anxieties regarding the future.

Economic Investment in Fishing: The fishing communities of these villages have over generations invested in a variety of fishing assets which reflect their immense knowledge of the sea and its resources. This is also primarily their inter-generational cultural heritage and only source of income. To be faced with the threat of displacement and potential loss of their traditional occupation and the substantial investment which they have made is unacceptable to them

The Table 5 below gives the current fishing asset inventory of the nine villages and estimates the total replacement costs of the same in current prices (2023) which is Rs 6869 lakhs or Rs 69 crores. It is this investment which has been providing them with a sustainable and generous stream of income, and plentiful fish for the avid fish eaters of Kerala.

Table 5: Fishing Assets in 9 fishing Villages south of VISL and their Replacement Costs				
	Craft/Gear	No of Units	Average Replacement Cost in current prices (2023) (Rs)	Total Estimated Replacement Costs in current prices (Rs. Lakhs)
1.	Kattumaram	390	20,000	78
2.	Tsunami Maram	607	40,000	243
3.	Vallam (motorised)	1076	210,000	2260
4.	Thattumadi	420	110,000	462
5.	Kambavalla	74	700,000	518
6.	Other nets	1087	28,000	304
7.	Hook and Line sets	577	20,000	115
8.	Outboard Engine 9.9 HP	1200	110000	1320
9.	Outboard Engine 15 HP	106	125000	132
10.	Outboard Engine 25 HP	420	180000	756
11.	Outboard Engine 40 HP	110	230000	253
12.	Battery	1000	18000	180
13.	Lights	1100	5000	55
14.	Wireless	350	13000	45
15.	GPS	480	20000	96
16.	Eco-Sounder	105	50000	52
TOTAL REPLACEMENT COSTS				Rs 6869 lakhs or Rs 69 Crores

Assessing Earnings: Fish in the sea is a gift of nature. It is the fishers of Kerala who have, through their knowledge, technology, and hard labour, been able to harvest this resource and provide the delicious delights of the sea to the consumers in Kerala, many of whom cannot do without at least one meal without fish.

We have been able to arrive at a revenue estimate for these 9 villages by considering the daily contribution which is made to the local parish community by the fishers which is a fixed proportion of their daily income. Based on this we consider the total revenue from fishing to be between Rs 23000 and Rs 25000 lakhs per annum. Taking the higher estimate of Rs. 25000 lakhs, the per family annual gross revenue is Rs 25000 lakhs/15412 families which works out to Rs 1.62 lakhs/family/annum.

It is worth noting that a portion of the catch is retained for self-consumption after each fishing trip, which typically amounts to about 8-10 percent of the total revenue. Including this self-consumption value, the gross imputed revenue per family reaches Rs 1.78 lakhs annually. The actual net income derived from this revenue depends on the various fishing costs, which vary depending on the nature of fishing and other factors.

The prospect of relinquishing this cultural heritage, substantial investment, and reliable income, either individually or collectively, is simply NOT an option that can be accepted in the name of

port development. This port development, in its current form, offers minimal direct or indirect benefits to the affected fishing communities. Their concerns and interests must be considered as central in the decision-making process – particularly in any future expansion or changes in the configuration or status of the port.

Human Rights and Imminent Threat to Occupational Heritage

If the fishers living in the south of the Vizhinjam port find themselves unable to pursue their fishing activities in a specific area due to the restrictions imposed by the port operations, it hinders their ability to fully assert their rights concerning access to fisheries resources and tenure in other sea locations. Particularly for small-scale fishermen who rely on fishing for their sustenance and livelihoods, these rights are essential for the realization of multiple human rights. These rights include access to food, the opportunity to work, and the preservation of cultural heritage. These rights encompass those explicitly acknowledged and endorsed by prominent international agreements such as the United Nations Universal Declaration on Human Rights (UNUDHR), the International Covenant on Civil and Political Rights (ICCPR), and the International Covenant on Economic, Social, and Cultural Rights (ICESCR).

For the fishing communities of Thiruvananthapuram District, the act of fishing is deeply entwined with their identity and way of life, encompassing customs, traditions, heritage, and daily existence. Consequently, the imposition of restrictions by the port, preventing them from exercising their right to fish, not only disrupts their customary practices but also jeopardizes the transfer of fishing knowledge and experiences between fishermen and their communities across generations. This ultimately places the full expression of fishermen's rights to participate in cultural life at risk.

Spatial Injustice: Large-scale projects of this nature often give rise to significant inequalities and engender profound injustices on a grand scale. These ambitious investment endeavours frequently appropriate areas that were once communal, spanning both maritime and terrestrial domains, leading to the displacement and dispossession of coastal communities. Many of these affected communities are primarily engaged in fishing activities, yet their essential role is often overlooked and inadequately accounted for in decisions and plans related to coastal infrastructure and the use of coastal territories. In stark contrast, these investment projects typically enjoy support and endorsement from the state's elites, who often institute favourable policies and political frameworks to facilitate profitable investments, while simultaneously displacing fisherfolk and local communities. This disparity highlights a systemic issue of unequal power dynamics, where the voices and rights of marginalized coastal communities are overshadowed by the interests of the privileged elites, exacerbating the already existing spatial injustices in the region.

Implications of ISPS for Fishing Communities

For any international port to function, it requires a certification called the International Ship and Port Facility Security (ISPS) certification.

This was granted to Vizhinjam International Seaport (VISL) on 5th September 2023. The ISPS is a set of regulations established by the International Maritime Organization (IMO) to enhance the security of ships and port facilities around the world. The ISPS certification is valid for five years. The certification allows foreign cargo and passenger ships to reach the port and obtain immigration clearance. The certification also paves the way for international growth. The official UN/Locode of the Vizhinjam port is INVZJ. When a port is granted ISPS certification, it means that the port has implemented security measures and procedures to prevent and respond to security threats and incidents. These security measures are primarily focused on preventing acts of terrorism, piracy, and other unlawful activities in and around ports.

However there are several far-reaching implications of ISPS certification which can result in problems for fishing communities around the port. These need to be discussed with the fishing communities in an open and transparent manner to prevent the issue of security being used as an alibi for restricting the rights of the fishers to live and livelihood:

1. **Enhanced Security Measures:** ISPS certification requires ports to implement enhanced security measures, including restricted access to sensitive areas, surveillance systems, security personnel, and security plans. These measures can have both positive and negative effects on fishing communities.
2. **Potential Delays:** Fishing activities may experience delays due to security measures at the port. Increased security checks and inspections of vessels entering and leaving the port can add time to the fishing process, which may impact the livelihoods of fishing communities.
3. **Access Restrictions:** ISPS regulations may lead to restricted access to certain areas of the port for fishing communities. This can affect their ability to use port facilities, unload catches, or access amenities within the port.
4. **Compliance Costs:** Ports often pass on the costs of implementing ISPS security measures to users, including fishing communities. Compliance costs, such as fees for security services or infrastructure upgrades, can place financial burdens on local fishermen and fishing-related businesses.
5. **Economic Impact:** ISPS certification can enhance the overall security and reputation of the port, potentially attracting more maritime traffic. This increased maritime activity can indirectly affect fishing communities by restricting their fishing. However it may also create job opportunities and increasing demand for their products.

6. **Increased Security Awareness:** The presence of ISPS security measures can increase security awareness among fishing communities. Fishermen and other community members may be more vigilant and report suspicious activities, which can help prevent security incidents.
7. **Collaboration Opportunities:** Fishing communities and port authorities may find opportunities for collaboration on security-related matters. Joint efforts to enhance security and safety in the port area can benefit both parties.
8. **Training and Awareness:** ISPS certification often includes training and awareness programs for port personnel and stakeholders, including fishing communities. This education can help fishing communities understand and navigate the security measures in place.

In summary, ISPS certification for a port can have both positive and negative implications for fishing communities. While it enhances security and safety in the port area, it may also lead to access restrictions, compliance costs, and potential delays in fishing operations. Effective communication and collaboration between port authorities and fishing communities can help mitigate some of these challenges and ensure that security measures are implemented in a way that minimizes disruptions to the livelihoods of those dependent on fishing activities.

In Conclusion

There are major ethical and human rights concerns stemming from the potential displacement of fishing communities due to projects like the Vizhinjam container port. These communities face severe consequences, including beach erosion, loss of homes, and disruptions to their cultural and livelihood practices, all of which raise questions about human rights violations. International agreements, such as the Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights, protect these communities' rights to property, housing, food, and work. The United Nations Declaration on the Rights of Indigenous Peoples and Sustainable Development Goals also emphasize the importance of safeguarding coastal communities' rights and livelihoods. The chapter concludes that a rights-based approach is crucial to address the challenges faced by these communities and calls for equitable and sustainable solutions.

Additionally, the chapter discusses the implications of ISPS certification for the port, noting both positive and negative effects on fishing communities. While it enhances security and safety, it can also lead to access restrictions, compliance costs, and potential delays in fishing operations. Effective communication and collaboration between port authorities and fishing communities can help mitigate these challenges, ensuring that security measures do not disrupt the livelihoods of those dependent on fishing activities.

10. Remedial measures – Long Term

The marine fishing communities, despite their immense contributions to the well-being of Kerala society, sadly continue to be perceived by the larger society as socially backward, marginalized, and vulnerable. One important reason for this is that members of the larger society in Kerala who visit beaches rarely have the opportunity or inclination to interact with members of the fishing community. For others it is a case of “out of sight, out of mind.”

It is imperative that this unjust attitude undergoes a transformation.

Recognizing the invaluable role which fishing communities play in the economy of Kerala, supporting their priority rights to sandy beaches, and ensuring access to unpolluted coastal seas is not just an act of fairness but a strategic imperative for the larger interest of Kerala.

These communities, deeply rooted in the coastal regions, have been the guardians of the sea for generations. Their expertise in sustainable fishing practices is a beacon of ecological wisdom that safeguards the marine resources and ensures food security in the form of the tasty seafood delights which most Keralites cannot do without! Their labour also generates valuable seafood exports which earn the country substantial foreign exchange. Their traditions enrich the cultural tapestry of Kerala, making it a unique and attractive destination for tourists.

Have we forgotten their huge unselfish voluntary contribution during the deluge of 2018? They saved the lives of over 60,000 people, with whom they have no earlier relationships, purely because of their ‘ocean value systems’ which makes it an obligation to help any human being in distress at sea, regardless of any other considerations.

To continue benefiting from their contributions, it is crucial that they are no longer marginalized and their rights to the beaches and coastal areas are upheld.

Therefore, embracing the fishing communities and supporting their priority rights to the coastal areas is not just a matter of social justice but a pragmatic decision. It is in the best interest of Kerala to recognize and celebrate their heritage and contributions, for their well-being is intertwined with the well-being of the entire state.

The citizens of Kerala need to become more aware of the fact that without sandy beaches and unpolluted and accessible coastal waters, the very survival of fishing communities of Kerala is under threat. This cruel reality is today best highlighted in Thiruvananthapuram District. Saving beaches and the coastal sea is also in the self-interest of all citizens of Kerala.

This JPS Report has been primarily mainly focused on the impact of the VISL port construction on the beaches, the coastal sea, and the livelihoods of fishing communities in Thiruvananthapuram District.

Scientifically built coastal structures are certainly needed for a variety of reasons, including for ensuring beach protection and livelihoods. There is no doubt about this.

However, two factors need to be kept in mind.

The first factor is the following: Engineering structures built on land are place-specific and largely restricted in the extent and direction of their negative externalities. Structures at sea, on the other hand, because of the fluidity and fuzziness of the aquatic milieu, create physical externalities which are hard to predict even with the best of simulation models.

The second factor is that there is a threshold limit for built structures on the coast that interface with the sea. Predicting that limit is difficult and when it is crossed, it can only be at the peril of both beaches and livelihoods. As of now (2023), in Thiruvananthapuram District we seem to have under-appreciated the first and crossed the limit of the second.

Undoubtedly short-term remedial measures are warranted when there is a combination of the physical de-spoiling of the beaches, disruption of the fishing occupations, and risk to life and habitat of the fishing communities.

But more importantly what is needed is some long term, radical, visionary thinking.

In this Chapter, it is the long-term thinking which we set out to achieve.

We consider three critical aspects that we propose as the right path for revival of our sandy beaches which will include:

- (1) a moratorium of seawalls and a managed retreat of habitation for a sustainable living for our fishing communities;
- (2) harnessing the original natural beauty of our beaches so that the full economic benefits from tourism can be greatly enhanced and
- (3) acknowledging that the socio-cultural and spiritual healing of all citizens can be addressed by offering them their use-rights (usufruct) for access to the beach and the sea.

Moratorium on the madness of seawalls

Today as much as 370 kilometres of Kerala's 590 km coastline has some form of "protection" in the manner of granite walls. This is resulting in untold loss of the occupation of small-scale fisheries due to denial of beach landing possibilities. The overtopping of the walls by the sea – a frequent occurrence in the monsoon months and during storm surges-- increases the risks of

flooding; causes hazards to the adjacent dwelling units and raises the probability of health issues due to water stagnation and increased potential for disease. This has also led to a considerable loss of potential beach tourism revenue.

Revival of the sandy beaches of Kerala is a priority for fishers, for tourism – domestic and international.

It is also vital for just the sheer joy of making humanity's innate bond with the seas.



Fig 10.1: Seawalls of Chellam (2022): Perhaps a coastal engineering marvel, but an ugly eyesore and not a solution

Credit: Hindustan Times

While seawalls might seem like a straightforward solution for beach protection against coastal erosion and storm surges, they often have several negative consequences and are considered a less desirable approach due to several environmental and social reasons such as the following reasons:

Beach Narrowing: Seawalls disrupt the natural sediment flow along the coast, causing sand and sediment to be trapped on one side of the wall. This leads to beach narrowing and the loss of valuable recreational space for beachgoers.

Disruption of Natural Processes: Seawalls interfere with natural coastal processes such as sand movement and sediment transport. These processes play a crucial role in maintaining healthy beaches and coastal ecosystems.

Accelerated Erosion: Seawalls can increase erosion in adjacent areas. When waves hit the seawall, they rebound back with greater force, scouring the beach in front of the wall. This can lead to more severe erosion and undermine the beach's stability over time. This phenomenon is known as "coastal armouring" or "beach starvation."

Loss of Beaches: Seawalls can lead to the loss of beaches as they prevent natural sediment movement along the coast. Over time, the beach can become narrower or disappear entirely, negatively impacting tourism and recreational activities that rely on sandy shorelines.

Loss of Beach Ecosystems: Seawalls disrupt the natural habitat and nesting grounds for various marine and coastal species. They can also prevent beach-dwelling organisms from accessing essential resources, further impacting local ecosystems.

Unightly Aesthetics: Seawalls can be visually unappealing and can detract from the natural beauty of the beach. This aesthetic degradation can negatively affect tourism, as visitors may find the altered landscape less attractive.

Costly Maintenance: Seawalls require regular maintenance and repair to remain effective. The constant exposure to saltwater and wave action can lead to deterioration, and upkeep costs can be burdensome for local governments and communities.

Limited Effectiveness: While seawalls may protect properties directly behind them, they do not address erosion on adjacent shores. The redirection of wave energy can lead to increased erosion in neighbouring areas, creating a "domino effect" of erosion problems.

Coastal Squeeze: As seawalls protect development and infrastructure on the landward side, they often lead to a "coastal squeeze" effect. This restricts the natural landward migration of coastal habitats, reducing their resilience to sea-level rise and climate change impacts.

Sea Level Rise: With the ongoing threat of sea level rise due to climate change, seawalls may become ineffective in the long run as they do not address the underlying issue of rising sea levels and changing coastal dynamics.

In addition to the above factors, the reality of climate change, sea level rise and the increasing intensity of storm surges (which we are already witnessing) are going to happen whether the coast is natural or artificial.

Additionally, there is the fact that all the granite for seawalls comes from the neighbouring hills and the Western Ghats. The result is that we ruin two ecosystems for no reason.

BOX 8: Rethinking Seawall Construction: Call for a Moratorium on Ecological Imbalance

The practice of sourcing granite for seawalls through hill blasting has drawn attention to a concerning ecological imbalance. While seawalls play a temporary role in coastal protection, the method of obtaining construction materials through blasting poses significant risks to both coastal and inland ecosystems. The detonation process not only disrupts local habitats and soil stability but also triggers sediment runoff that can compromise water quality, affecting aquatic life and downstream environments.

To address this ecological madness, it is imperative to consider a temporary moratorium on the current practices. A proactive pause would allow for a comprehensive reassessment of coastal protection strategies, emphasizing sustainable alternatives that harmonize with the environment rather than harm it. Prioritizing the implementation of "living shorelines" and eco-friendly construction methods could strike a balance between safeguarding coastal infrastructure and preserving the delicate coastal and hillside ecosystems.

In the face of escalating climate change impacts, it is crucial to adopt a holistic and responsible approach to coastal development. By advocating for a moratorium on harmful practices and promoting ecologically sensitive alternatives, we can pave the way for a more resilient and harmonious coexistence between human infrastructure and the natural world. The call for change is an opportunity to prioritize long-term sustainability over short-term gains, ensuring the health and vitality of our coastal ecosystems for generations to come.

Alternative approaches, such as beach nourishment (adding sand to eroded beaches), dune restoration, are often considered more sustainable and environmentally friendly options for beach protection. These strategies work with natural coastal processes rather than against them, allowing for more adaptive and resilient coastal management.

A fact sheet prepared in 2014 by the National Centre for Sustainable Coastal Management (NCSCM), of the nine coastal districts of Kerala, it is Thiruvananthapuram District which has the highest rate of erosion – 23.3 percent – and 29 percent of its coastline or 23 kms -- is 'artificial coast'.

Resorting to seawalls as the answer to erosion seems to be a knee-jerk reaction in Kerala if we examine the disproportionate number of tenders issues for their construction.

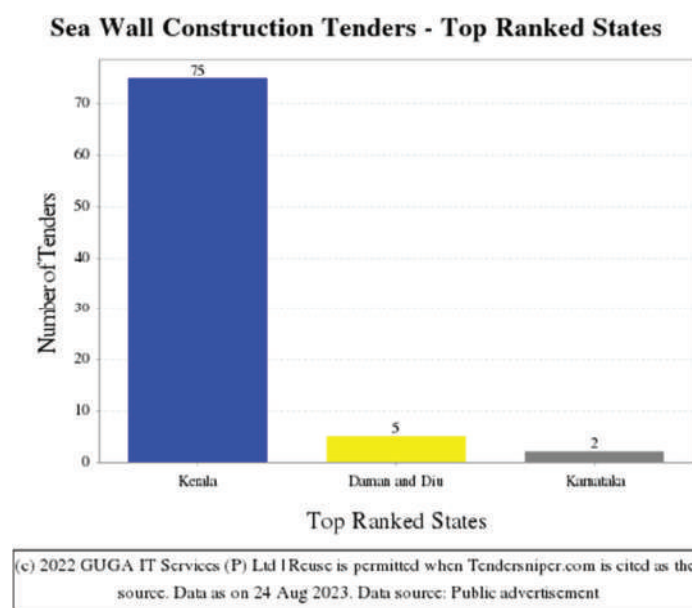


Fig 10.2: Seawall Tenders – Kerala Leads

Now consider a scenario where the whole coastline of Thiruvananthapuram District of 78 kms is “protected” with seawalls.

The pace at which erosion is predicted for the beaches north of Thiruvananthapuram City (Pradeep J, Shaji E et al, 2022), and if we adopt the current ‘business as usual’ approach of the contractor lobby, the coastal engineers, and the politicians, a fully sea-walled coast for the district could become a reality soon!

Taking the recent (2022) budget allocation for seawalls in Chellanam of Rs 344 crores for 7.5 kms works out to Rs 47 crores per kilometre of coastline¹⁸. At these current prices, ‘sea walling’ the 78 kilometres of Thiruvananthapuram District would cost a phenomenal **Rs 3666 crores**.

To prevent further mindless ‘destruction of beaches’ with seawalls, there is immediate need for a complete moratorium on this madness.

¹⁸ Even the re-formation works on damaged seawalls are tendered at rates which are **Rs 42 lakhs for 100 meters length**. <https://tendersnipcr.com/search/ph/sea-wall-construction-tenders-india> (accessed August 24, 2023)



Fig 10.3 Between seawall and Compound Wall! Credit: KV Thomas



Fig 10.4 The seawall is already being scoured by the waves! Credit: ULCCS Ltd

Embracing the Tide: Strategically Managed Coastal Retreat

In the face of mounting challenges posed by intensifying coastal erosion, soon to be accompanied by rising sea levels, it is time for us to reevaluate our approach to coastal protection. For decades, seawall construction has been the go-to solution, promising immediate defense against the encroaching tides. However, this seemingly steadfast solution has proven to be a double-edged sword, exacerbating environmental degradation and social inequities.

It is high time we shift our focus towards a more sustainable and forward-thinking strategy: strategically managed coastal retreat. This is a viable and economically, socially, and ecologically sensible and desirable alternative for gradual relocation of people and coastal development away from vulnerable areas of the coast and leave the beach to the sea to heal.

By embracing this approach, we not only safeguard our coastal ecosystems and preserve cherished natural treasures but also secure the livelihoods and well-being of coastal fishing communities for generations to come.

The JPS wishes to present an action plan for transitioning away from seawall building and adopting a more resilient, adaptive, and ecologically sound path towards coastal protection. To put this in perspective consider the following:

Stage One:

According to the Government of Kerala, in 2018, there were 3340 fisher families, spread across 19 villages of Thiruvananthapuram District, who live within 50 metres of the HTL. If these families are, as a matter of priority provided with Rs 25 lakhs to shift away from the coast, it would only cost **Rs 835 crores**. If their welfare is prioritised, then the argument of *'people want the seawall'* will no longer be immediately valid in Thiruvananthapuram.



Fig 10.5: There is need to restore and re-create the sandy beaches of Kerala.
A setback line of 200 metres from the HTL

Stage Two:

In keeping with the state CZM Plans decide on a setback line of 200 metres from the HTL. This should be the minimum distance that should be declared as a ‘total no-development zone.’ This zone is the fuzzy sea-land interface. It should be considered a heritage zone¹⁹.

Beyond the 200-metre line, the priority should be for collective use by registered fishers for placing their craft and gear, marketing of their fish and other related fishery-related uses which require only open infrastructure facilities such as auctioning halls.

¹⁹ In Costa Rica (Central America), there is a law, enacted in 1977, called the **Law on Maritime Terrestrial Zone**. It was following enactment of this law that Costa Rica became world-famous for tourism and sustainable small-scale fishing, Art 1 of that law states: The maritime-terrestrial zone constitutes part of the national heritage, belongs to the State and is inalienable and imprescriptible. (Art 3) Its usufruct and administration, both public and restricted areas, correspond to the municipality of the respective jurisdiction (Art 9) The terrestrial maritime zone is the 200-meter-wide strip along the Atlantic and Pacific coastlines. Note that Kerala and Costa Rica are in the same latitude (8 degrees to 11 degrees N) and have very similar coastal eco-systems.

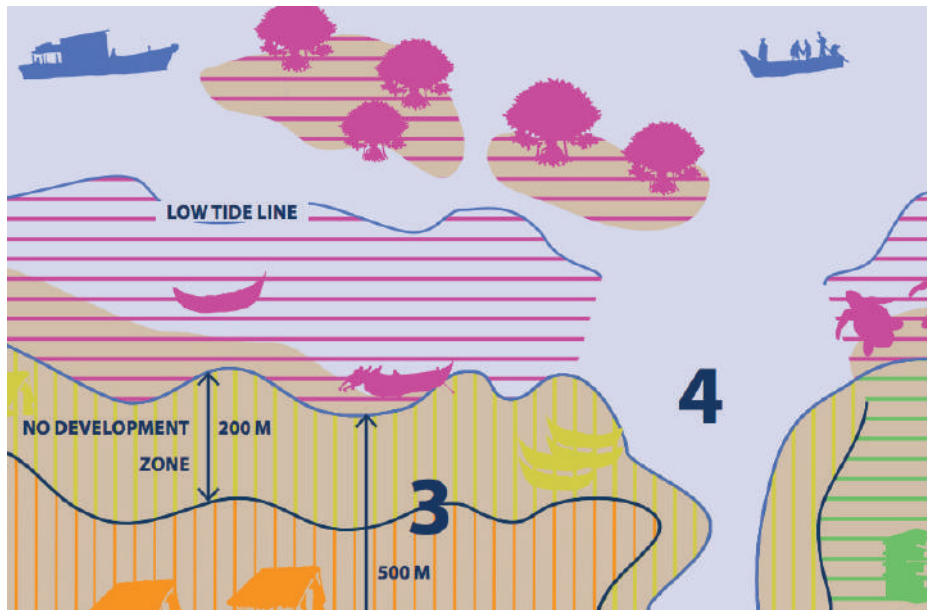


Fig 10.6: No Development Zone



Fig 10.7: Permissible Open structures for fishery related activities between 200 and 500 meters above the HTL

Planned resettlement of the coastal communities towards the eastern side of the coastal road using a community-oriented habitation plan along the lines of what was done in the **Marianad village in Thiruvananthapuram District in the 1960s**.

The concept of ‘designed villages’ for fishing communities can be attributed to the vision of Late Bishop Peter Bernad Pereira. (See Appendix B for full details) Seeing the congestion and squalor of fishing villages in Thiruvananthapuram, in the early 1960s, the church purchased land in the village of Alillathura, near Perumathura, built a village – initially of 60 houses -- to the east of the coastal road and resettled people there. This village he named Marianad. The village then grew organically attracting fishing families from the crowded southern villages of the district. Marianad is today one of the most vibrant, economically well off, and progressive fishing villages in the district. Another good example of community-oriented rehabilitation is in Pallithura. This followed the granting of the Thumba fishing village and the church in the village to the ISRO in the 1960s, by Bishop Peter Bernad Pereira. These events are described by Dr. Abdul J Kalam, former President of India. It is said that the rehabilitation was completed in 100 days as promised by ISRO.

Box 9: New Rights For Coastal Areas		
BEACH ZONATION	PERMITTED ACTIVITY	USUFRUCT RIGHTS
High Tide Line (HTL) to 200metres	Total No-Development Zone where no structures are permitted	Beach for enjoyment and relaxation of all citizens of the country
200 metres to 500 metres	Only open occupational-related structures for <u>common, collective-use</u> for fishing sector permitted	Priority access for collective use by fishworkers
Beyond 500 metres and on the eastern side of current coastal road	Designed Villages for coastal fishing communities	Priority for Community-oriented habitation plan for fishing/coastal communities

In accordance with the Guidelines for preparation of Coastal Zone Management Plans (CZMP) of the MoEFCC²⁰ it is mandatory for Local level CZMP Maps to be prepared for the use of local bodies and other agencies to facilitate implementation of the Coastal Zone Management Plans.

Cadastral (village) maps in 1:3960 or the nearest scale as available with revenue authorities shall be used as the base maps. These are to include in the CRZ areas, the fishing villages, common properties of the fishermen communities, fishing jetties, ice plants, fish drying platforms or areas infrastructure facilities of fishing and local communities such as dispensaries, roads, schools, and the like, shall be indicated on the cadastral scale maps. States and Union territories shall prepare detailed plans for long

²⁰ These Guidelines of MoEFCC are dated F.No 12-1/2019-IA III of 26th June 2019

term housing needs of coastal fisher communities in view of expansion and other needs, provisions of basic services including sanitation, safety and disaster preparedness.



Fig 10.8: Our Beaches. Our Sea

Credit: Emi Koch

A brigade of educated youth and young fishers of each village should take the initiative to facilitate such mapping of spaces and use these maps as basis for claiming their rightful entitlements.

An acre of land along the coastal belt of Thiruvananthapuram costs about Rs 8 crores. In one-acre of land, adopting a community-oriented and designed village habitation approach (individual houses and community facilities) as many as 30 houses can be constructed.

Provide 2-3 cents of land to be registered jointly in the name of a couple (or in the name of single-headed households) and build the basic structure of the houses in an imaginative manner to allow the occupants to be able to expand/expand their facilities in accordance with their requirements, tastes, and their future financial resources.

The construction of 30 houses at about Rs. 12 lakhs/house will cost about Rs. 4 crores making the total for land and houses Rs 12 crores. By a rough estimate therefore, good, and sustainable rehabilitation of 100 households will cost about Rs. 40 crores which is less than the cost of 1 kilometre of seawall construction.

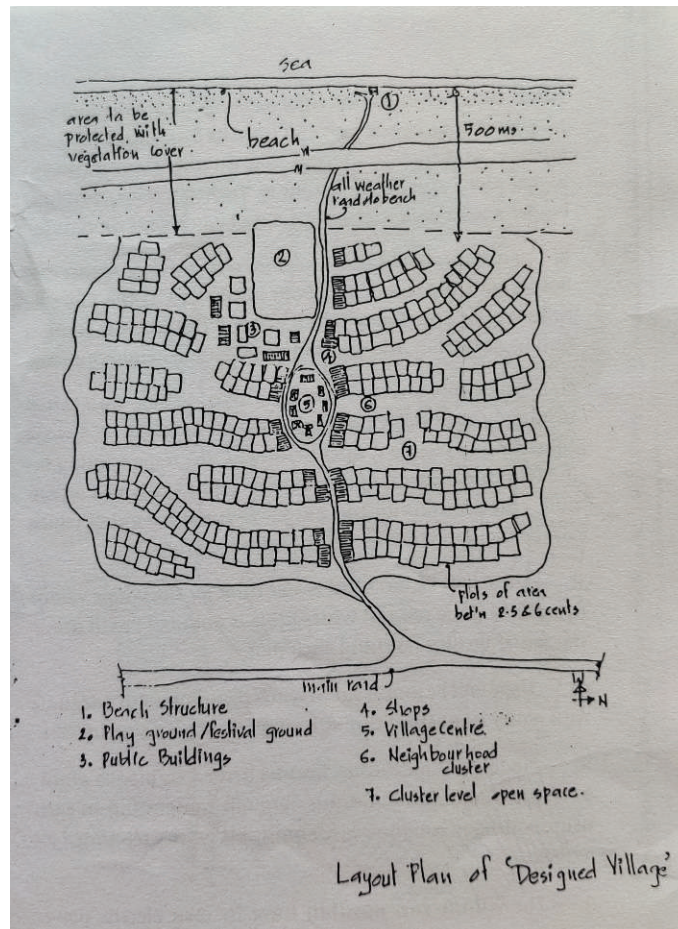


Fig 10.9: Designed Villages

If 10,000 out of the 33,000 houses currently existing in the fishing villages of Thiruvananthapuram District require such re-location, there will be need for 100 acres of land which will cost Rs 800 crores. The construction of 10,000 houses will cost Rs. 120,000 lakhs or Rs. 1200 crores making a total of **Rs. 2000 crores**

If there are seawalls near the area where these designed villages are being constructed, then wherever possible, dislodge the seawalls and recover the granite which can then be utilised as foundation and wall for the newly envisaged community housing. The costs further reduce!

Ultimately, the choice between seawall building and managed retreat depends on the specific circumstances of each coastal area, including factors such as the level of coastal erosion, projected sea-level rise, community preferences, and available resources. In many cases, a combination of approaches, including nature-based solutions, may offer the most economically and environmentally sustainable approach to coastal management. Decision-makers need to carefully evaluate the trade-offs and involve relevant stakeholders in the decision-making process.

BOX 10: Comparing Seawall Building and Strategic Managed Retreat**1. Initial Costs:**

- **Seawall Building:** Constructing seawalls typically involves significant upfront costs. The expenses include engineering design, materials, construction labor, and permits. The costs can vary depending on the length and height of the seawall and the specific conditions of the coastal area.
- **Managed Retreat:** Managed retreat may also require substantial initial investments, primarily related to acquiring new land away from the shoreline and relocating infrastructure and people. The costs can vary based on property values, infrastructure complexity, and community cooperation.

2. Ongoing Maintenance:

- **Seawall Building:** Seawalls require regular maintenance to remain effective. Exposure to waves, tides, and saltwater can lead to wear and damage over time, necessitating repairs and periodic inspections. Maintenance costs can add significantly to the overall expenses.
- **Managed Retreat:** Once managed retreat is implemented, ongoing maintenance costs may be lower compared to seawalls since there is no need to maintain the structures. However, there might be additional expenses related to managing new developments and infrastructure in the retreat areas.

3. Long-Term Effectiveness:

- **Seawall Building:** Seawalls can provide short-term protection against erosion and storm surges. However, they may eventually become less effective due to rising sea levels, changing coastal dynamics, and the need for costly repairs and modifications.
- **Managed Retreat:** Managed retreat allows for natural coastal processes to occur, giving more long-term flexibility to adapt to changing sea levels and coastal conditions. Over time, retreating from the shoreline can be a more sustainable approach.

4. Social Implications:

- **Seawall Building:** Seawalls can offer a sense of security to coastal communities by providing immediate protection. However, they may negatively impact the aesthetics and recreational value of beaches, potentially affecting tourism and property values.
- **Managed Retreat:** Managed retreat involves relocating communities and infrastructure away from the shoreline, which can be a complex and emotionally challenging process for affected residents. Social factors, community acceptance, and equity considerations are essential when implementing managed retreat.

5. Environmental Impact:

- **Seawall Building:** Seawalls can disrupt natural coastal processes, harm marine habitats, and contribute to coastal erosion in neighboring areas.
- **Managed Retreat:** Managed retreat allows for the restoration and preservation of coastal habitats, contributing to the overall health of the ecosystem.

Revive Sustainable Beach Tourism

Over the years Kerala has lost 70 percent of its beaches to erosion. In Thiruvananthapuram District today 42 of the 78 kms is eroding.

Coastal erosion can have significant impacts on beach tourism, as it directly affects the condition and attractiveness of the beach for visitors. Here are some ways coastal erosion can affect beach tourism:

Loss of Beach Area: As the shoreline erodes, the beach area shrinks, reducing the available space for tourists to enjoy recreational activities, sunbathing, and beach sports. Smaller beaches may become overcrowded during peak tourism seasons, leading to a less enjoyable experience for visitors.

Infrastructure Damage: Coastal erosion can damage or destroy beachside infrastructure, such as hotels, resorts, restaurants, and beachfront attractions. These establishments may be forced to close or undergo costly repairs, impacting local economies that rely on tourism revenue.

Safety Concerns: Eroding coastlines can create hazardous conditions for tourists. Steeper cliffs and collapsing dunes may pose risks to beachgoers, leading to accidents and potential injuries. Tourists may feel less secure and avoid visiting erosion-prone beaches altogether.

Altered Scenic Beauty: Coastal erosion can change the appearance of the beach and its surroundings. The loss of natural features, such as sand dunes and vegetation, can reduce the aesthetic appeal of the beach, diminishing its allure for tourists seeking picturesque landscapes.

Impact on Wildlife: Erosion can lead to the destruction of coastal habitats, affecting the local wildlife and ecosystems. This may deter eco-tourists who seek to experience and observe the unique flora and fauna of coastal areas.

Beach Nourishment Costs: To counteract erosion and maintain a desirable beach for tourists, beach nourishment projects may be undertaken. These involve adding sand or sediment to replenish eroded shorelines. While effective, these efforts can be expensive and may require substantial funding from the local government or private businesses.

Negative Publicity: The negative effects of coastal erosion, such as beach closures, hazardous conditions, and visual degradation, can attract negative publicity in the media and online. This adverse publicity can deter potential tourists from visiting the affected beaches.

Loss of Tourism Revenue: If erosion severely impacts the beach's appeal, tourism numbers may decline. Fewer visitors mean reduced revenue for local businesses and tourism-related industries, potentially leading to economic challenges for the community.

To mitigate the impacts of coastal erosion on beach tourism, proactive measures such as coastal management and protection strategies, sustainable tourism practices, and public awareness campaigns about erosion and its consequences are essential. Additionally, fostering a deeper understanding of the importance of preserving coastal environments can encourage responsible tourism and conservation efforts.

Beach erosion undoubtedly poses a significant threat to recreation and tourism and consequently the economy. After all, the beach is the raw material supporting the tourism industry.



Fig 10.10: Tourists enjoying the beaches and waves Credit: AI Supporter

If the beach is left to the sea, the natural sediment dynamics will gradually re-create the coast into sandy beaches which were once the hallmark of much of Thiruvananthapuram District. Today (2023) the demand for sandy beaches and sun is not just from international tourists, but more regularly from rising aspiration for leisure within the domestic population – particularly in Kerala State.

Income from tourism had contributed to approximately 12% of Kerala's State Domestic Product (SDP) till the pandemic had struck. Former member of the tourism advisory committee K.V

Ravisankar believed it has potential to contribute 20% of the SDP²¹, considering its collateral impact on allied sectors like real estate, IT, medical tourism, culture, and rural economy/agriculture. The lull in arrival of foreign tourists will get worse if steps are not taken to protect beaches in the State. The worst hit will be the Kovalam beach, since the Vizhinjam port project could prove the death knell for the beach, which is extremely popular among foreigners.

According to the Kerala Tourism Department in 2021 there was a record in the domestic tourist arrivals. As many as 75 lakh (75,37,617) visited. If we consider only the tourists from within the state, this number is 61 lakh (61,37,243) – that is 80 percent of the visitors are locals. This is on the rise since in 2013 when the percentage of locals was 68 percent.

If we assume that at least half of them visited a beach, that would be 30 lakhs. Taking a very conservative estimate, if they spend even one day and spend Rs 1000 per head for that visit, then the revenue generated for sustainable beach tourism would be **Rs. 300 crores**²². Beaches are a get-away to heal the soul of the whole of society

Beaches are a get-away to heal the soul of the whole of society

The Covid pandemic made the general population of Kerala more aware of the healing benefits of the vast expanse of beaches – where they still existed. With increasing temperatures, and greater economic prosperity, the general population of Kerala, especially the 80 percent who live near the sea, will place a big premium on wanting to visit the beaches of the state to relax and get away.

²¹ The Gross SDP of Kerala in 2022-23 prices was estimated at Rs 9,99,643 crore.

²² The total revenue from all forms of tourism in Kerala for 2021 was Rs.12,285 crores. Of this Rs. Rs.461 Crores was foreign exchange earnings. Rupee earnings was thus Rs 11824 crores. This is what the tourist spends. So the per capita spending was Rs1182400 lakhs/7537617 domestic tourists = Rs 15,686 per domestic tourist/year.



Fig 10.11: Vaavu Bali devotees' have no choice but to throng at sand patches between the stoned beaches of Kerala

For the religious minded, even if it is only once a year at Karkada vaavu (July/August), they wish to have unhindered access to the sea. The beaches for the Vaavu-bali are diminishing and the crowds are increasing, as was evident in 2021 and 2022.

Even if one adult in 50 percent of the Hindu households wishes to perform the Vaavu bali and would be willing to give up a day's wage provided there is good access to clean beaches, then the estimate of **willingness to pay for such an ecosystem service will be of the order of about Rs. 200 crores for that one-day event in a year²³**.

In Conclusion

In conclusion, it is imperative for the larger society in Kerala to recognize and support the fishing communities' priority rights to sandy beaches and unpolluted coastal seas. Despite their invaluable contributions to the state's economy, culture, and even during times of crisis, these communities are unfairly marginalized. Embracing and upholding their rights is not just a matter of social justice but a pragmatic decision, as their well-being is intertwined with the well-being of the entire state. The citizens of Kerala must realize that the survival of fishing communities is under threat without these resources, making it a matter of self-interest for all.

²³ 54 percent of Kerala population of 35 million is Hindu in 2023 and at 5 persons per household that is 7 million households (HH) in Kerala and Hindus form (7x54/100) 3.78 million HH. So even if one member from 50 percent of HH wishes to offer Vaavu Bali, that is about 1.90 million persons. At Rs 1000 (one day wage) as the willingness to pay for a clean and safe beach, the total value people are willing to pay is Rs 1000 x 1.90 million = Rs 1900 million or about Rs. 190 crores

In the specific context of Vizhinjam, Kerala, the construction of a large container port has given rise to a pressing issue: the construction of unsightly seawalls to counter beach erosion caused by port structures. However, these seawalls not only detract from the scenic coastline but also pose a threat to the vibrant beach-based fishery and coastal tourism industry, which have deep cultural and economic roots in the region. Furthermore, these beaches hold immense subjective and relational value for the citizenry. They serve as spaces for relaxation, religious events, and public gatherings, thus enriching the cultural fabric of the state.

Considering these concerns, advocating for a long-term resettlement package takes on added significance. Proposing a strategy that entails dismantling the seawalls, restoring the natural beach ecosystem, and relocating fishing communities thoughtfully can yield numerous benefits.

This approach addresses the financial imbalance between the exorbitant cost of seawall construction and the practicality of a comprehensive resettlement plan. It also underscores a commitment to ecological preservation, considering the extraction of granite from neighbouring hill ecosystems to construct the seawalls.

Moreover, a central aspect of this argument is recognizing that the beaches are integral to the citizens' well-being. They provide a space for relaxation, communal activities, and religious observances, enhancing the overall quality of life. These invaluable uses are jeopardized by beach erosion and the construction of unsightly seawalls, which appear to primarily benefit building contractors and politicians rather than the community.

By presenting a holistic perspective that acknowledges the economic, environmental, and social dimensions, a case for a resettlement package emerges as a balanced and responsible solution. Such an approach embraces the citizenry's connection to the beaches, advocates for their preservation, and envisions a future where the region's natural beauty and cultural heritage are upheld for the benefit of all.

CONTESTING SEAWALLS

**In the name of progress, we build seawalls tall,
But in truth, they bring dismay to one and all.
Expensive barriers of stone in the sea we sow,
While hills we plunder, from where granite does flow.**

**These walls obscure the beauty of sandy shores,
As nature's grace with concrete menace pours.
The beaches, once a haven for young and old,
Now lie hidden, their stories left untold.**

**Small-scale fishers, their occupation at stake,
Struggle to navigate through this stone-laden wake.
Habitats disrupted, their homes torn apart,
The waves of change erode their very heart.**

**For what price must we pay to chase the dream?
Seawalls rising high, as nature's voice does scream.
The cost is steep, our environment pays the toll,
As we build walls that bind both body and soul.**

**Let's heed the call of nature's gentle plea,
Preserve the beaches, let them roam wild and free.
Protect the fishers, their livelihoods secure,
For in harmony with the sea, we can all endure.**

Passionate Supporter

11. Present status of VISL and its realistic future

There has been so much hype and whipping up of expectations about the immediate completion of the port and the arrival of the first ship before October 2023.

What the public in Kerala need to understand is that the success of a commercial transshipment port is NOT merely about being at a strategic location close to the international shipping routes and having a natural deep-water harbour.

Therefore, just completing the construction of a breakwater which is to provide berthing facilities to vessels DOES NOT mean the port is ready for commercial operations.

The current attempt by the politicians, the VISL, the big media and other civil society supporters has been to eyewash the public into believing that the Vizhinjam dream will be realised before 2023 is over -- if only it was not 'opposed' by the fishing communities and some 'anti-development' activists.

The truth is that a commercial transshipment sea port terminal involves more than just berths and safe anchorage facilities for container vessels. While berths and anchorage are indeed important components, there are several other essential requirements for a successful and efficient commercial transshipment sea port terminal. These requirements typically include:

1. **Berths and Wharves:** Berths are essential for mooring vessels to facilitate the loading and unloading of cargo. Adequate berths with appropriate depths and lengths are crucial to accommodate a range of vessel sizes. Efficient wharves equipped with appropriate infrastructure for cargo handling, such as cranes, conveyors, and storage facilities, are vital for the smooth flow of cargo operations.
2. **Navigational Aids and Channel Depth:** Navigational aids, such as buoys, beacons, and GPS systems, ensure safe navigation for vessels entering and exiting the port. Maintaining a proper channel depth is essential to accommodate larger vessels and prevent groundings.
3. **Safe Anchorage Areas:** While berths are essential, safe anchorage areas are equally important for vessels to wait before entering the port. These areas provide a safe space for vessels to anchor while awaiting berthing availability or for weather-related reasons.
4. **Cargo Handling Equipment:** Adequate cargo handling equipment, such as cranes, forklifts, and conveyor systems, is necessary for efficient loading and unloading of containers and other cargo types.
5. **Storage Facilities:** Container yards and warehouses are required for temporary storage of cargo before it is further transported to its destination. These facilities need to be well-organized and equipped for efficient cargo handling and retrieval.

6. **Customs and Inspection Facilities:** Custom and inspection facilities are essential for processing and inspecting cargo in compliance with import and export regulations.
7. **Security Measures:** Robust security measures, including surveillance systems, access control, and screening procedures, are vital to ensure the safety of cargo, personnel, and the overall port operations.
8. **Logistics and Connectivity:** Efficient road, rail, and possibly air connectivity to and from the port is necessary for the seamless movement of cargo to and from hinterland areas.
9. **Information Technology Infrastructure:** Modern port operations rely heavily on digital systems for cargo tracking, documentation, and communication. Robust IT infrastructure is essential for smooth coordination and data exchange.
10. **Environmental Considerations:** Ports must adhere to environmental regulations and implement measures to mitigate potential environmental impacts. This includes managing waste, preventing pollution, and adopting sustainable practices.
11. **Emergency Response and Medical Facilities:** Adequate emergency response capabilities and medical facilities are necessary to address accidents, incidents, and medical emergencies that may occur within the port area.
12. **Skilled Workforce:** Trained and skilled personnel are essential for operating the port efficiently, including roles in cargo handling, logistics, security, maintenance, and administration.

In summary, a commercial transshipment sea port terminal requires a comprehensive and integrated approach, encompassing not only berths and anchorage but also a range of infrastructure, equipment, services, and regulatory compliance measures to facilitate efficient and secure cargo handling, storage, and transportation.

IN TRUTH HOW MUCH OF THIS IS READY AT VIZHINJAM TODAY??

The truth about the present and the future of VISL is however very different. The JPS reading of the situation includes the following:

The Completion of VISL

- The VISL was expected to have its port in operation by 2019. The current date of start has been re-fixed as mid-2024. As per the original agreement, if completion was not achieved in 1000 days Adani VPPL was to pay Rs. 12 lakhs/per day to the Government of Kerala. AVPPL now resorts to *force majeure*²⁴ for not abiding to the agreement due to a series of events -- the damage caused to the breakwater by Cyclone Ockhi (2017), the lack of supply of granite (2019), the Covid crisis (2020-21) and the fishing community agitations (2022). AVPPL now demands 78.70 crore for damages, delay etc from agitation. The current (August 2023) state of development of the facilities at Vizhinjam, the many unanticipated

²⁴ Force majeure is a clause in contracts that releases both parties from liability or obligation when an extraordinary event occurs. The term comes from French and translates to "overwhelming force" or "superior force".

hurdles ahead (extreme weather events, non-availability of granite etc), and the history of time overruns with regards major infrastructural development in Kerala, do not posit a bright future for scheduled completion of this 'dream project'.

- In a most recent newspaper report (*The New Indian Express 23 July 2023*) the struggle which VISL is waging with nature is very clearly expressed by an officer who says: *"We are not able to carry out major works on the breakwater during the monsoon season. Even if there is no rain, the area is affected by high sea waves. We are hoping to resume the work by October 2023"*. He further admitted that they have also suspended the dredging works and shifted the dredgers to safer locations. A part of the breakwater, including small boulders and accropodes, were also damaged after high-intensity waves crashed into it. The VISL reports that to date (July 2023) the project, has completed only 54.73 per cent of the breakwater and 68.5 per cent of the dredging and reclamation works.
- According to the submission of the VISL to the Expert Appraisal Committee (EAC) of the MoEFCC on 24 August 2023 the breakwater construction is only 62 percent complete (after 8 years!) and the date given for completion of Phase 1 of the project is December 2024 – 5 years behind the original schedule. The EAC has insisted that the ToR for the next phases will be approved only after a public hearing is conducted.
- To showcase its accomplishments, the LDF Government held a high-profile inauguration event in October 2023, celebrating the "arrival of the first ship" at the Vizhinjam port. This elaborate inauguration, which incurred a cost of Rs 66 lakhs, stands as a prime illustration of the questionable tactics employed to accentuate the government's achievements. The extravagant celebration of a ship that merely carried a gantry crane, an essential component of the port's infrastructure, is akin to commemorating the opening of a shopping mall while its shelves are still being built. This incident highlights the manipulative nature of political presentation and underscores the importance of transparent and substantive achievements rather than symbolic gestures. It underscores the necessity for more forthright and meaningful demonstrations of progress in governance and public projects to earn the trust and confidence of the unsuspecting public.
- Given the pace at which progress is being made, and the numerous 'barriers' along the way, it is very unlikely that the port will be fully operational even by 2025.



Fig 11.1: VIS Breakwater as on June 3, 2023

Traffic and Competition for VISL

- Container traffic forecasts for India have been overestimated. The EIA made for VISL made a forecast in 2012 that by 2020 the container traffic in India would be 13 million TEU or 188.5 million tonnes (1TEU=14.5 metric tonnes). However, for India, in 2020, we achieved only 146.5 million tonnes or about 10 million TEU equivalent (www.statista.com). Whatever the reasons for this poor performance, the possibility of VISL altering this trend, by its own performance, is highly unlikely.
- Three important ports in the South Asia region, all of which were commissioned stating that they will attract the mega container traffic on the main East-West shipping route, remain highly underutilized and unable to meet their planned financial viability even remotely. These are Vallarpadam ICTT in Kerala, Hambantota, and Oluvil in Sri Lanka. Despite the hype during the planning, none of them have been able to attract transshipment container traffic and either remain non-operative or merely cater to other needs. It is hard to imagine that VISL will buck this trend.
- In the near term, VISL will face competition from Vallarpadam and Colombo for transshipment traffic. These ports, especially Colombo, hold a competitive advantage due to their well-established operations, the presence of global industry leaders in port operations, strong relationships with shipping lines and shippers, and superior logistical networks. Furthermore, with substantial investments nearing Rs 6000 crores in the Western Container Terminal of Colombo Port by the Adani Group, coupled with the US International Development Finance Corporation's co-investment of US \$553 million (as reported in November 2023), there is a potential conflict of interest for the Adani Group in ensuring the economic viability of VISL, given their relatively lower investments in this venture.
- Reports in April 2023 claimed that there would be an expected shift of traffic from Sri Lanka to Vallarpadam ICTT, in view of the crisis in Sri Lanka. But nothing of the sort

happened. The volume of container handling at ICTT dropped from 7.35 lakh Twenty Equivalent Units TEU) in 2021-22 to 6.95 lakh TEU in 2022-23 which has caused concern among the port authorities. The infrastructure provided through huge investment from the public exchequer is underutilized. The Cochin Port is spending Rs 140 crore annually on dredging, to maintain the required draft of 14.5 m. Besides, Rs 60 crore per year is being granted as concessions on Vessel Related Charges (VRC) free of cost to shipping companies by ICTT for making the terminal competitive and attracting ships. This has resulted in a loss of Rs 577.23 crore loss during the last 10 years according to the Cochin Port Joint Trade Union Forum general convener.

- Additionally, the Government of India is currently soliciting bids for an international container transshipment port with an investment of Rs 41,000 crore, which is five times the capital injection into VISL. This port is slated to be situated in the Galathea Bay of the Great Nicobar Island. The reasons cited for the anticipated triumph of this undertaking closely mirror those put forth for Vizhinjam. It boasts a deep-water location with a rocky sea bottom, necessitating no dredging, and is conveniently positioned just eight nautical miles from the East-West Sea Route. The prospects for the realization of this port are also notably promising, as in the sparsely inhabited islands, there are fewer potential sources of protest and other socio-political uncertainties! Upon the materialization of this 'Nicobar dream,' it is bound to introduce formidable competition for VISL.
- Consider also the latest developments (November 2023) regarding Maersk, one of the world's largest shipping companies, responsible for approximately one-sixth of global container trade. They have recently announced plans to reduce their workforce by an additional 3,500 employees due to declining freight rates and decreased demand. These layoffs are set to commence immediately and are expected to continue into 2024. The repercussions of this decision will undoubtedly reverberate throughout ports worldwide. It is evident that VISL and AVPPL will not be immune to these effects, despite the 'big dreams' of the Government of Kerala.

Not by Port Alone

- The excessive focus on VISL's deepwater feature and its proximity to the international shipping route often obscures the fact that shipping companies take various other crucial factors into account when selecting their port of call. These factors encompass port charges, the efficiency of container handling infrastructure, turnaround times, and the quality of rail and road connectivity, among others.
- It is widely acknowledged that greenfield ports around the world seldom rely solely on transshipment traffic. One key reason for this is the unpredictability of transshipment traffic, partly due to the peculiar ownership structure of global shipping lines. Major shipping lines are known to engage in hub-hopping, frequently shifting between ports of call for various reasons. The abrupt move by Maersk from Singapore to a new port facility in Malaysia, following their acquisition of a 30 percent stake in it, serves as a pertinent example. To secure a degree of guaranteed traffic, one approach would be to encourage

shipping lines to invest in VISL. However, given the historical track record of substantial private sector investments in Kerala, this is a highly improbable scenario.

- In the long run, ports that lack strong ties to the local economy of their hinterland are unlikely to be economically sustainable. In this context, VISL's hinterland situation falls short of expectations. The experience of Vallarpadam illustrates that, despite the backing of the Central Government and the development of robust road and rail infrastructure, port utilization rates remain low due to the absence of a vibrant hinterland economy. This does not bode well for VISL, especially considering that even the connectivity to the hinterland has yet to be finalized.
- The success of VISL hinges on its capacity to establish world-class facilities, optimize berthing capacity, forge strategic partnerships for cargo and traffic development, and maintain flexibility in setting port charges. Given that only one or two ports in India have managed to meet all these criteria, the outlook for VISL appears rather challenging.

Who Loses, Who Gains

- Considering all the factors mentioned above, VISL is poised to drain the finances of the Government of Kerala (GoK) merely to be labelled a 'completed project' and maintain its operations. As of August 2023, the Government still requires over Rs 2000 crores for the port to be fully operational as a viable enterprise. This sum includes expenses for adjacent land acquisition, land for the railway line from the port to Nemom, pre-payment to Konkan Railway for construction, the cost of the now-planned underground railway, and GoK's share of the Viability Gap Funding (VGF).
- Signs of financial strain are already apparent, as the Government of Kerala struggles to secure the necessary funds for APVVL to complete the breakwater infrastructure for the port. GoK is actively seeking loans from various institutions like HUDCO and Kerala Finance Corporation (KFC). In August 2023, HUDCO raised concerns that the government guarantee was insufficient, and it insisted that loan repayments be included in the government budgets, potentially increasing the public government debt burden, which is a politically sensitive matter. Another indication of an uncertain future lies in the fact that the Government has even sought changes to the contractual terms regarding the revenue-sharing arrangements with the Government of India, a request that was ultimately denied.
- Additionally, the emerging sediment transportation dynamics indicate a potential ongoing necessity for dredging to keep the shipping channel of VISL open and clear. This would entail recurring substantial expenses and unidirectional physical externalities in the form of coastal erosion, resulting in disaster mitigation and related costs for the government.
- Port assets have a very long gestation period, with a lifespan of 50 to 100 years. Consequently, if VISL fails to generate profits, these assets will have limited alternative utility, essentially becoming underutilized. VISL may, at best, serve as a facility for small container vessels, occasional cruise liners, and fishing boats.

- For AVPPL, the success of VISL in attracting traffic is of little consequence. The Project Agreement includes provisions that extend the concession period if traffic falls below the target by 2 percent, but also to reduce it if traffic exceeds targets (a much less likely scenario!). As noted by the CAG (**refer to Chapter 4 of this Report**), AVPPL has nothing to lose in either case.
- Meanwhile, the Concessionaire (AVPPL) will benefit by utilizing the land within the port estate for commercial activities, capitalizing on the scenic beauty of the area. This utilization of land underscores one of the reasons why port development in the Vizhinjam site was ill-advised in the first place.

BOX 11: Revised extract from the writings of a political scientist working on maritime issues

Author: Adarsh Vijay*

Sifting the hype from the fact about the potentials of the VISL is indeed a tall task.

While its theoretical potential is perhaps undeniable, the practical feasibility of labeling it a game-changer remains uncertain and may well fall into the realm of speculative scenario building.

One primary cause for skepticism revolves around the question of whether this port can significantly reduce India's reliance on foreign terminals for container handling, particularly the prominent Colombo Port. Additionally, there is doubt regarding the project's ability to adhere to the set four-phase completion deadline, given the past instances of delays. The industrial underdevelopment in the port's surrounding hinterland limits the potential advantage in gateway traffic, tilting the balance in favor of transshipment traffic and thus influencing the project's survival.

Complicating matters, India's struggle with transshipment is exacerbated by comparatively higher port handling charges and elevated costs associated with port calls for cargo vessels. Colombo, with its lower marine charges and proximity to the East-West Sea Route, holds its appeal as the preferred choice for shipping liners. However, India's track record of policy inertia is no stranger, and this is echoed in the project's progress. Even the initial phase of the port fell significantly behind its projected schedule, failing to meet the "1000 days" deadline promised by the Adani Group. A series of factors contributed to this delay, including the disruption caused by the 2017 Cyclone Ockhi along the Kerala coast, demands for additional dredging, procurement issues due to local resistance near quarries, and slow advancements in breakwater facilities.

Long-term operational dynamics are poised to be influenced by the potent and politically affiliated labor unionism that has plagued the region. The recurring labor strikes and their subsequent economic ramifications are a well-established norm, extending to the port precincts as well. Successfully navigating these challenges demands a more strategic approach to labor-management interactions. Additionally, local opposition, especially from nearby coastal fishing communities, driven by environmental concerns, adds another layer of complexity to the socio-demographic aspects of the project's implementation.

Vijay A 2018: Vizhinjam Port: A Maritime-Strategic Capital? Maritime Perspectives 2018 (Maritime Developments in Indo-Pacific Region in 2018)



Aerial Photo of Vizhinjam International Seaport taken 21 September 2023

Credit: Anand Kurien

12. Social Licence to Operate – A Way Forward

A prevalent notion, often championed by those in positions of power and administration, equates all infrastructure construction with "development," while characterizing any opposition to such endeavours as "anti-development."

For many decades, the construction of artificial ports and their subsequent adverse effects on coastal lands and communities has remained a significant issue in various parts of our country and other nations. This viewpoint is supported by a substantial portion of the scientific community (Pilkey OH & Cooper JAG, 2014).

Recalling the past, an expert committee appointed by the Government of India, led by Dr. S. Ayyappan, who served as the Director General of ICAR from 2010 to 2016, proposed recommendations within its 'National Policy on Marine Fisheries' after consulting with various stakeholders in the marine fisheries sector. These recommendations importantly addressed the impact of port development on fishers' livelihoods, stating:

“Development of ports often leads to erosion and accretion along Indian coasts. Changes brought about in coastal configuration from such developments impact the coastline, damage fisher habitations, and affect the ecology and fisheries. This is a matter of grave concern affecting fisher livelihoods and the resources they depend on. Government will consider placing adequate mechanisms to ensure that the opinion of fishers is taken before such projects are launched. In cases where subsistence activities and livelihoods of fishers are impacted, such fishers will be considered as project affected people, and suitable rehabilitation measures will be implemented.” (para 38, NPMF draft 2016)

However, when the final 'National Policy on Marine Fisheries, 2017' was published in the Gazette, the Government of India significantly altered only the above recommendation, stating:

“Development of Ports sometimes leads to erosion and accretion along the coasts. These developments may bring changes in coastal configuration, which may have an impact on the coastline, ecology, and fisheries. Government will consider placing adequate mechanisms to address these aspects while considering infrastructure developments on the coast.” (para 38, NPMF, 2017)

Notably, fisher organizations in Kerala, affiliated with both the LDF and UDF, opposed this dilution in the national fisheries policy and even organized protest rallies about this.

The current opposition to the Vizhinjam commercial port should not therefore be viewed in isolation. In 2017, a significant transshipment port plan in Enayam, Kanyakumari district, Tamil

Nadu, included in the Sagarmala project, had to be abandoned by the Indian government's Shipping Ministry due to opposition from coastal communities. The protest was led by an action council with substantial support from the Church hierarchy and various political parties, including Congress and Communist parties.

In this context, it is regrettable that a government in Kerala, ostensibly pro-working-class, resorted to suppressing the coastal community's opposition to the Vizhinjam port, labelling it as "anti-development" and even "anti-national." This situation underscores a lack of understanding among our administrators and political leaders regarding coastal processes and a tendency to overlook scientific viewpoints on this matter.

Negotiating A Way Forward

Dhamra, Gangavaram, Kattupalli, Krishnapatanam, Vadhavan, and Vizhinjam: these are the names of coastal hamlets where communities find themselves at odds with Adani Ports and SEZ Ltd. due to the contentious construction of ports affecting coastal ecology and livelihoods. This clash of interests is just a precursor, as there are more conflicts waiting in the wings.

Amidst the backdrop of government-backed investment schemes like Sagar Mala, our nation's coastline is poised to undergo a surge in port infrastructure projects, facilitated by private partnerships. However, this surge will inevitably give rise to significant confrontations between the investors spearheading these projects and the coastal communities directly impacted by such ambitious developmental endeavours.

As we set out to weigh in with our key findings and recommendations, about our comprehensive assessment of the port construction undertaken in Vizhinjam and into the aftermath that ensued, we find it imperative to shed light on a foundational issue and introduce a pivotal concept that demands inclusion in the blueprint of any forthcoming port developments.

The issue pertains to the inherent conflict which exists regarding the perspectives and values about the beach and the coastal sea between those who wish to press for investments such as the transshipment port on the one hand, and the active fishworkers and fishing communities on the other.

It is also necessary to set this conflict against the background of the new discourse on the Blue Economy which has found favour with our governments and industrial interests as the new frontier for economic expansion for materials and services to create more 'economic growth'.

We need to view the Blue Economy discourse, specifically about the realms of beaches and coastal sea, from four different lens (perspectives).

1. **Beaches and the coastal sea as nature's gift (capital).** Here the view is to highlight and assess, in qualitative and quantitative terms, the benefits of conservation and the

economic opportunities that arise from increased protection of these realms. The primary activities or uses considered within this lens tended to be eco-tourism, marine protected area (MPAs) and payment for ecosystem services models as also the existence value of this realm for the present and future generations.

2. **Beaches and coastal sea as realms of livelihood and cultural heritage.** Here the view is to frame the discourse as addressing the issues of employment, food security and building social and economic resilience. The primary activities considered within this lens are small scale fisheries, tourism, and the subjective and relational use of the realms by all the citizens of the land.
3. **Beaches and coastal sea as the source of good business.** This lens emphasises the scale of economic contributions of these realms to ocean-based industries linked to global markets in order to lay stake to the importance of these realms and their capacity to deliver greater growth. In most cases the focus of this lens relates to large, corporate enterprises dealing in the port infrastructure, shipping, industrial fishing, oil and gas and seabed mining sectors.
4. **Beaches and coastal sea as drivers of innovation.** This lens promotes the seemingly limitless potential of these realms by imagining them as sources of new discoveries and new wealth. The focus of this lens is largely technical and technological innovations across all sectors, with a particular emphasis on new and emerging sectors such as ocean based renewable energy, industrial mariculture and aquaculture, biotechnology, and seabed mining.

It is evident that while all these perspectives are valid, they do not necessarily sit together in harmony. Any effort to negotiate the differential spaces for these perspectives, to be articulated and accepted, must recognise the economic and social power inequalities of the stakeholders holding these perspectives. It is only in this manner that development processes can be undertaken where Blue Economy ambitions can be made ecologically appropriate, socio-economically inclusive, gender just and sustainable.

Social Licence to Operate

The concept we wish to introduce amidst this backdrop is the **Social Licence to Operate (SLO)**. This concept can be succinctly defined as the *'continuous acceptance and approval of an operation by those local communities affected by it and those stakeholders who can affect its profitability'* (Voyer & Leeuwen, 2019).

In recent decades, a significant shift in societal expectations has redefined how corporate entities engage in their operations, especially in sectors involving natural resources and the environment. Communities now increasingly demand active participation in decision-making processes for such undertakings. Their expectations extend beyond a mere share in benefits; they also seek

concrete assurances of well-regulated corporate practices. In response, the concept of the social licence to operate (SLO) has risen to prominence across various industries, becoming an integral component of their social responsibility strategies. Central to this concept is the notion that a community possesses the power to either support or oppose a project. Initially emerging from an industry perspective, the social licence concept recognizes the need for a comprehensive consideration of social impacts, diverse viewpoints, and effective management of social risks.

Remarkably, this concept has garnered substantial acceptance among investors. It aligns seamlessly with the paradigm of governance transcending traditional government structures, as civil society's influence continues to burgeon. It serves as a response to mounting pressure, stemming from waning public trust in governmental mechanisms and processes, and the growing belief in the legitimacy of environmental oversight by communities and civil society at large.

Introducing the notion of the Social Licence to Operate (SLO) into the discourse surrounding the conflict between the VISL transshipment port and the fishing communities is both pertinent and illuminating. This concept offers a robust framework for comprehending and reconciling the divergent viewpoints and interests entwined with the utilization of beaches and coastal waters.

The Social Licence to Operate surpasses the confines of legal permits such as Environmental Impact Assessments (EIAs) and regulatory guidelines, encompassing the intricate tapestry of social, cultural, and ethical facets inherent to any project.

Within the context of the conflict between the transshipment port and fishing communities, let us delve into the potential applications of the Social Licence to Operate concept:

Legitimacy and Trust: The transshipment port's perspective of viewing the beach and sea as a realm for innovation and good business aligns with the economic development narrative. However, without the Social License to Operate, the port's operations might lack legitimacy and trust among the local fishing communities. These communities see the beach and sea as nature's capital gift to them and integral to their cultural heritage and source of livelihood. By acknowledging and respecting the communities' concerns, a port can establish a foundation of trust and mutual understanding.

Engagement and Communication: Obtaining a Social License to Operate involves meaningful engagement with stakeholders, including fishing communities. Transparent communication about the benefits and potential impacts of the port's operations can bridge the gap between differing perspectives. By involving the communities in decision-making processes and showing a commitment to address their concerns, a port can demonstrate its willingness to coexist harmoniously.

Mutual Benefits: To address the conflict, the concept of Social License to Operate encourages the port to explore ways in which its operations can contribute positively to the well-being of the fishing communities. This could involve initiatives like job creation, supporting local businesses,

or investing in community infrastructure. Demonstrating a commitment to shared benefits can help shift the perception of a port from a potential threat to a responsible neighbour.

Cultural Considerations: The concept of Social License to Operate emphasizes the importance of understanding and respecting local cultures and values. The fishing communities' view of the beach and sea as natural capital and a source of livelihood is deeply rooted in their cultural heritage. A port can acknowledge this cultural significance and work towards minimizing any negative impacts on the cultural identity of the community.

Fairness and Justice: The conflict between profiting from the beaches and sea and preserving them raises questions of fairness and justice. Social License to Operate requires the port to address these concerns in a way that does not disproportionately benefit one party at the expense of the other. Finding a compromise that respects the economic interests of a port while safeguarding the fishing communities' access to their natural resources is a key element of obtaining social acceptance.

In summary, integrating the concept of Social License to Operate into the discussion can help both parties recognize the importance of a balanced and equitable approach to utilizing the beaches and coastal seas. By actively engaging with the fishing communities, respecting their cultural heritage, and demonstrating commitment to shared benefits, the transshipment port can work towards obtaining the social acceptance needed to operate successfully while minimizing conflicts and negative impacts.

In Conclusion

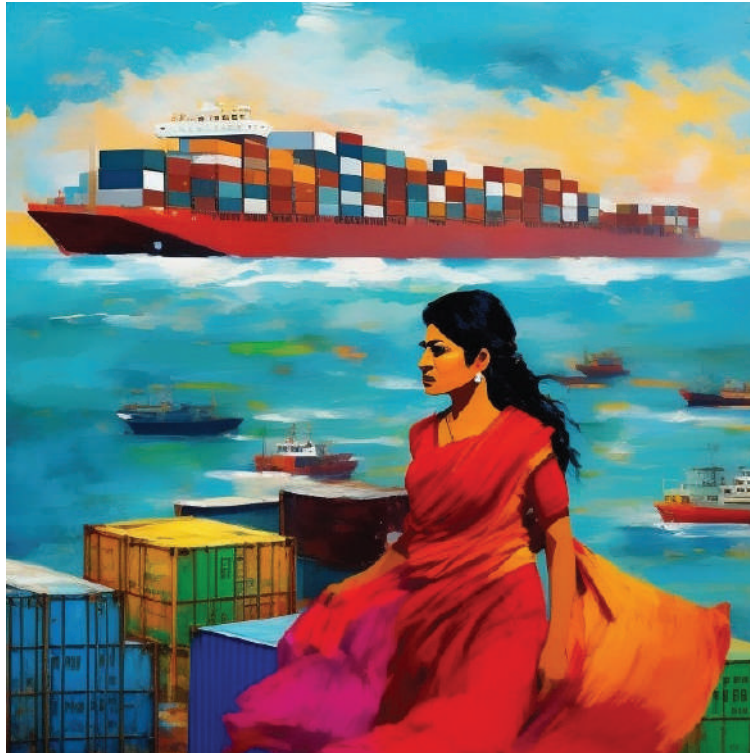
The notion that all infrastructure construction signifies "development" and opposition is "anti-development" is deeply entrenched in those in power. The long-standing issue of artificial port construction and its adverse coastal impact has scientific support.

Regrettably, even a government in Kerala, despite its pro-working-class image, has suppressed opposition to the Vizhinjam port by labelling it "anti-development" and "anti-national." This highlights a fundamental lack of understanding among our administrators and political leaders regarding coastal processes and a tendency to disregard scientific perspectives.

The clash between Adani Ports and SEZ Ltd. and coastal communities across India's coastline foreshadows potential confrontations as more port projects arise. These ambitious initiatives, under schemes like Sagar Mala, will stir more significant conflicts in the future.

The core issue lies in the diverse perspectives on the value of beaches and coastal seas, ranging from nature's gift to livelihood and business. Introducing the concept of Social License to Operate (SLO) becomes pivotal, promoting legitimacy, trust, engagement, mutual benefits, cultural considerations, and fairness. SLO encourages transparent communication and shared benefits, emphasizing social acceptance.

The introduction of SLO, albeit somewhat belated, underscores the need to consider coastal communities' perspectives in developing commercial ports, fostering ecologically appropriate, socio-economically inclusive, gender-just, and sustainable Blue Economy ambitions.



13. Conclusions and Recommendations

1. The Interconnectedness of Beaches, Coastal Seas, and Human Rights

The synergy between beaches and the coastal sea is profound and ecological. These stretches of shoreline, along with the encompassing sea, stand as the cherished legacy of our fishing communities, deeply woven into their livelihoods and cultural tapestry. It is crucial to recognize that the protection of these ecosystems is not only a matter of environmental conservation but also a fundamental human rights issue, as articulated by the United Nations.

It is recommended that the Kerala State Human Right Commission (KSHRC) suo motu investigate if the VISL and AVPPL have adhered to the foundational principles of the UN Guiding Principles on Business and Human Rights. They must both uphold the foundational principle A11 which states: "Business enterprises should respect human rights. This means that they should avoid infringing on the human rights of others and should address adverse human rights impacts with which they are involved." Government, investors, and civil society must recognise the non-negotiable nature of this linkage between environmental conservation and human rights and incorporate measures to ensure that it is explicitly recognised in the preparation of project reports and environment and social impact analyses for so-called development projects.

2. Balancing Vizhinjam's Heritage, Fishing Communities, and Development

Vizhinjam is historically significant, dating back to the Ay Dynasty, and once served as a state capital and maritime trade hub. Vizhinjam and its closely adjacent villages host the largest number of traditional fishing communities in the State for whom fishing is the main source of income, employment, and food security. They have well-defined rights and shared responsibilities over coastal ecosystems. Vizhinjam and nearby Kovalam, due to its outstanding natural beauty and rocky reefs are popular tourist destinations, fostering water and beach related tourism. In Vizhinjam and Kovalam, the beach and coastal sea, represent a balance between the heritage of fishing communities and the shared resource of all citizens. Today there is the tension between the push for port development and the preservation of Vizhinjam's historical and natural heritage, particularly in the context of the fishing communities. Balancing these interests is crucial.

It is recommended that any further development in the Vizhinjam area should consider sustainable practices that allow the fishing communities to continue their traditional livelihoods while ensuring the protection of the region's historical and ecological assets. The consent of Local Self-Governing institutions (LSG) and grama sabhas must be obtained before any new plans for any infrastructure development are implemented. Sincere collaborative efforts between local stakeholders, government agencies, and environmental and civil society organizations will also help find a balanced solution that benefits both economic development and cultural preservation.

3. Challenges and Imperatives for Transparent Infrastructure Projects

The process leading to the grant of the Vizhinjam port contract to AVPPPL raises significant concerns. Transparency was lacking throughout the process, with multiple changes to project details and conditions, raising questions about fairness. The influence of political considerations, as well as environmental concerns related to the project's location in a sensitive area, added to the complexity. Furthermore, the absence of competitive bidding, a lack of recognition of the rights and claims of affected communities, and frequent changes in project details all contributed to a process that may not have been in the best interest of the public. This highlights the complexity of large-scale infrastructure projects and the need for transparent decision-making, thorough environmental assessment, and community engagement from the very start.

***It is recommended** that for further phased development of this project, it is vital to prioritize transparency, competitive bidding, and reliable, technically, and socially sound environmental assessments. It is also crucial to ensure community engagement and address compensation concerns for affected individuals to ensure responsible project development. The Janakeeya Samara Samithi should appoint a person of high repute as "People's Ombudsman" who can investigate complaints from individuals and groups who have been treated unfairly. Maintaining political neutrality in decision-making is essential to uphold the integrity of the process. Reducing frequent changes to project terms and conditions is necessary to offer stability and certainty to all stakeholders. Accountability mechanisms and adherence to best practices in project management and contract award processes should be fundamental in future infrastructure development. This approach ultimately serves the public's best interests while avoiding the issues observed in the Vizhinjam port contract grant process.*

4. Environmental Impact Assessment Deficiencies in Vizhinjam Port Project

The Environmental Impact Assessment (EIA) conducted for the Vizhinjam port project, highlights numerous instances of data manipulation and omission that cast doubt on the assessment's accuracy and transparency. Key issues include misrepresentations related to coastal stability, biodiversity, ecological sensitivity, impact on the existing fishing harbor, capital dredging, and the project's strategic importance. There have been inadequacies in considering critical environmental factors and the site selection process, which indicates a flawed assessment overall. It calls for a more comprehensive, honest, and transparent approach to environmental assessments for projects like the Vizhinjam port. The EIA notification must be amended to bring in accountability for those who prepare the EIA. There is also pressing need for improved oversight and accountability in the environmental assessment process for large-scale projects.

***It is recommended that** the Government take steps to address the deficiencies identified in the Vizhinjam port project's Environmental Impact Assessment (EIA), and prevent a repeat of such happenings in the future, the following steps should be considered:*

1. *It is recommended to establish independent oversight to ensure unbiased assessments of environmental impacts. This oversight would help maintain the integrity of the assessment process.*
2. *Full disclosure of all EIA data, methodologies, and sources is deemed crucial for transparency. This transparency would enable stakeholders and the public to scrutinize the assessment thoroughly.*
3. *Meaningful community consultation is highlighted as paramount, especially concerning concerns related to livelihoods and the environment. Engaging with the local community helps ensure that their perspectives and needs are considered in the assessment.*
4. *To deter unethical practices and misrepresentation, strict penalties should be enforced as a deterrent.*
5. *There is need for establishment of expert review panels consisting of environmental and social impact assessment experts. These panels would offer an independent evaluation of the EIA reports, enhancing their credibility.*
6. *Make audits of the EIA process. Such audits would verify that the assessment adheres to best practices and relevant regulations.*
7. *To protect individuals who report data manipulation, legal safeguards for whistleblowers should be instituted.*
8. *The importance of comprehensive public reporting of EIA findings and methodologies is paramount. This public reporting ensures transparency and allows stakeholders to assess the accuracy and reliability of the assessment.*
9. *If significant irregularities are identified post-approval, the possibility for reconsideration and potential revocation of Environmental Clearance should be a viable option. This ensures that the project remains in compliance with environmental standards.*
10. *There is need for separate guidelines for coastal projects like ports and harbors. These guidelines should give due consideration to coastal and nearshore morphological changes, processes, coastal and marine biodiversity, and the unique livelihood requirements of the fishing community.*

Collectively, these recommendations aim to improve the accuracy, integrity, and public accountability in future EIA processes for large-scale projects, particularly emphasizing the significance of coastal developments like ports and harbors.

5. Addressing Irregularities and Ensuring Fairness in Vizhinjam Port Project

The CAG's findings and subsequent developments reveal a series of irregularities and concerns regarding the Vizhinjam port project, ranging from changes in project structure to financial matters and coastal erosion issues. We conclude that the project's implementation and decision-making process need to be thoroughly reviewed to ensure transparency, fairness, and accountability.

It is recommended that the facts mentioned in the CAG report about the unfair advantage to the Concessionaire and potential loss to public revenues be reviewed by a government

constituted Finance Standards Committee. Also, future projects should undergo rigorous evaluation, adhere to established financial and environmental standards, and involve stakeholders to mitigate adverse impacts, as seen with coastal erosion.

6. Environmental Consequences of Vizhinjam International Seaport Construction

The construction of the Vizhinjam International Seaport (VIS) on the coast has raised significant environmental concerns. Factors such as headland bypassing, closure depth larger than the depth at the headland, step ladder nature of inner shelf sediment transport, and remotely forced long period swells have significant role in sustaining the sediment budget of the region. The introduction of an offshore breakwater at VIS has disrupted natural coastal dynamics, and upset the sediment budget, leading to severe erosion to the north of Kovalam and in the Pozhiyur sector to the south. Research directed by MoEFCC and the National Green Tribunal (NGT) shows that the erosion is primarily caused by human-made structures like the breakwater and inner shelf sand dredging rather than solely by climate change. South of the breakwater, beach accretion has occurred, blocking local streams, and causing coastal flooding during specific events. The breakwater has hindered the natural sand redistribution, exacerbating sand scarcity and erosion in southern sectors like Karumkulam, Poovar, Pozhiyur, Kollamcode, and Neerodi. The dredging for port maintenance has further disrupted sediment transport, affecting the ecosystem. Under Coastal Regulation Zone (CRZ) 2019, beach loss due to coastal projects should be compensated through interventions like beach nourishment, making VISL and AVPPL legally and socially responsible for addressing increased erosion and restoring the lost beach.

***It is recommended that** Governments should prioritize comprehensive environmental assessments for large coastal development projects, such as the Vizhinjam International Seaport, adhering to coastal regulations. Given the dynamic nature of the marine ecosystem, and its crucial economic, social and cultural importance to Kerala society, the Government should constitute a special Task Force for Review of Coastal Development Projects, with members consisting of appropriate independent experts to consider a long-term plan to balance economic development with environmental sustainability. Ongoing monitoring and research are crucial to understand environmental impacts, including sediment dynamics and erosion. Mitigation measures should be implemented, with a focus on beach nourishment and sediment management, giving back the beaches to the fishing communities and citizens. Local community and expert involvement in decision-making and monitoring are essential. Exploring eco-friendly construction methods is recommended. Strategies to combat erosion and support affected residents must be developed, while public awareness and education for coastal preservation are needed. Regular policy reviews and long-term planning are vital for sustainable development and climate change resilience.*

7. Protecting Biodiversity and Ecosystems in Vizhinjam Bay

The Vizhinjam port poses a significant threat to the region's biodiversity and ecosystems, particularly in Vizhinjam Bay, a vital biodiversity hotspot. The bay is home to 1,200 species spanning various phyla, including 15 rocky reefs teeming with marine life. These ecosystems

are essential for traditional fishing communities. However, activities like dredging and breakwater construction have already damaged the rocky reefs, jeopardizing marine life continuity. Over half of these ecosystems and their associated species are at risk of imminent extinction, even before the project's first phase completion. Traditional fishing communities, reliant on these resources for generations, face the loss of livelihood areas and fishing rights without adequate compensation. The project's Detailed Project Report and Environmental Impact Assessment have underestimated Vizhinjam Bay's ecological significance and potential harm to marine biodiversity and coastal ecosystems. Independent studies are recommended to address the loss of biodiversity and improve fish stocks. The destruction of marine biodiversity and rocky reef ecosystems, as well as their associated species and services, could have catastrophic consequences soon. Concerns about the project's long-term impact on biodiversity and local communities extend beyond the construction phase, emphasizing the need for a more comprehensive assessment.

It is recommended that the Government, in keeping with the guidelines of the UN Decade of Ecosystem Restoration, and the obligations under the Convention on Biodiversity (CBD), should commission the Kerala State Biodiversity Board (KSBB) to address the imminent threat to biodiversity from the Vizhinjam port project before further phased development of the port is initiated. Additionally, immediate measures for ensuring fair compensation for traditional fishing communities, who are gradually losing their customary livelihoods, is crucial.

8. Economic and Ecological Value of Coastal Ecosystem Services

The Vizhinjam region is characterized by significant coastal ecosystems that provide a wide range of valuable ecosystem services, including aesthetics, recreation, tourism, educational opportunities, coastal protection, and more. These services have a profound impact on human well-being, the environment, and the local economy. The loss of these valuable ecosystem services due to the construction of the Vizhinjam port is a very contentious issue and challenging to assess. Our preliminary and indicative assessment is that the loss of ecosystem services amount to about Rs 2027 crores per annum.

***It is recommended that the Government request the appropriate Departments of the University of Kerala to undertake a comprehensive evaluation of the true economic, ecological, and cultural value of these services by an inter-disciplinary team with the full and informed participation of the fishing communities.** Furthermore, there is need to highlight the importance of considering the long-term and multifaceted impacts of development projects on coastal ecosystems and local communities.*

9. Impact of Vizhinjam Port on Local Fishing Communities

The ongoing Vizhinjam port construction project presents a complex array of challenges for the community. Local fishermen have suffered substantial income losses due to disruptions in their traditional fishing practices. The absence of a comprehensive cost-benefit analysis

prior to project initiation resulted in the loss of over eight square kilometres of vital coastal fishing zones, adversely affecting their traditional livelihoods. Compensation for livelihood loss has been insufficient, particularly for those whose fishing zones cover the entire coastal waters. Construction activities have disrupted traditional fishing routines, reducing available fishing areas, damaging equipment, and causing financial setbacks. Women in the community have been compelled to seek alternative employment as domestic helpers due to decreased fishing income and a lack of fishery-related jobs, departing from their traditional roles. Safety concerns have arisen at the Vizhinjam fishing harbor due to increased turbulence and congestion, resulting in accidents and hindered boat movements. The community believes that the loss of their fishing zones and living spaces is irreparable, impacting both the current and future generations. The project's impact extends to their cultural heritage and the environment, underscoring the importance of balancing development and environmental preservation in decision-making processes.

It is recommended that the Government constitute an inter-departmental committee to oversee the speedy and correct implementation of all resettlement and compensation matters promised by both the Government and the AVPPL to the affected fishing communities. Efforts should be made to ensure the following:

- ❖ *Equitable Compensation: Ensure that compensation for income losses and other adverse impacts is distributed fairly among all affected parties, particularly the traditional fishing community.*
- ❖ *Rehabilitation and Support: Provide proper accommodation and facilities for those who lost their houses and assets, allowing them to continue pursuing fishery-related livelihood activities.*
- ❖ *Community Spaces: Compensate of lost cultural, social, and religious spaces, with the same priority, manner, and spirit as AVPPL was given land for commercial use.*
- ❖ *Habitat Regeneration: Priority efforts to regenerate lost habitats, especially beaches, should be a priority*
- ❖ *Sustainable Development: Emphasize informed decision-making that balances economic development with the preservation of the environment and the cultural and socioeconomic heritage of vulnerable coastal communities.*
- ❖ *Safety Measures: Implement safety measures to address concerns related to the reduced depth and increased turbulence at the fishing harbor mouth, ensuring the safety of traditional fishermen.*
- ❖ *Modernise fishing harbour: Provide good landing facilities, hygiene and waste management, facilities for marketing and processing with active co-management giving women fishworkers proper representation in governance.*
- ❖ *Community Involvement: Engage the local community, particularly the women, in the decision-making process and consider their perspectives when planning and implementing the future phases of the project to minimize adverse impacts.*

10. Coastal Erosion and Damage to Coastal Homes

A collaborative study with local volunteers and experts assessed damage to houses in the affected coastal areas since the start of the Vizhinjam port construction. Erosion patterns revealed a troubling expansion of damage north of Vizhinjam, with intensifying erosion in already affected coastal sectors. Approximately 289 houses suffered partial or full damage since the project began. Overtopping waves along seawall coasts caused significant damage during construction. The research identified a seasonal pattern, with more losses during the southwest monsoon season than during cyclonic events like Ockhi. The study highlights that human-made structures, including the port, harbor breakwaters, seawalls, and groins, significantly contribute to coastal erosion, especially north of Vizhinjam. It underscores the need for balanced decision-making to protect vulnerable coastal communities, their homes, culture, and socioeconomic fabric through robust environmental and social safeguards.

It is recommended that there be an immediate, comprehensive, and transparent environmental impact assessment (EIA) rectifying the shortcomings of the earlier EIA by accounting for the characteristic physical, social, and occupational features of this coast to assess damage caused by the Vizhinjam port construction to the homes north of Vizhinjam. Mitigation measures, fair compensation, and rehabilitation for affected residents, particularly fishermen and those who lost their homes, are crucial. The capital cost to rehabilitate land and houses will cost Rs 92 crores. Community involvement, safety regulations, and environmental safeguards must be enhanced. Seasonal impact mitigation, alternative livelihood development, cultural preservation, and long-term planning should be prioritized. Transparency, education, and investment in coastal erosion management are essential for a balanced and sustainable approach that benefits all stakeholders.

11. Priority Rejuvenation of Lost Beaches

Lost beaches in the port impact zone on the northern side have resulted in immediate loss of homes and landed property. It has also resulted in fishers having to cease many of their traditional fishing techniques like shore seines and created additional transportation costs to fish from other safer villages. The solution of seawalls should be avoided and creative measures to regenerate and renourish beaches giving special measures like those developed by NIOT (as in Pondicherry) be prioritised.

It is recommended that immediate measures be undertaken in Panathura, Poonthura, Beemapalli, Cheriathura, Valiyathura, Kochuthope and Shangumukham as a priority. VISL and AVPPL should take the responsibility for developing the beaches under an emergency programme with help of institutions with proven credible experience in designing and executing such projects. Sand which is available from maintenance dredging and dredging the Vizhinjam fishing harbour should be used for this compensatory nourishment in the northern villages. Continuous consultation and monitoring of the progress should be done with full, informed community participation.

12. Compensation and Remedial Measures for Fishing Communities

Remedial measures for addressing the impact of erosion and loss of life and livelihood due to the construction of the port are a matter of priority and a human right of the fishers. The onus of funding falls squarely on the AVPPL. Housing for those affected by erosion till 2022 would cost approximately Rs 92 crores. Houses affected by the piling works require Rs 25 crores. Loss of life in the port vicinity because of unanticipated sedimentation and turbulence should be compensated at Rs 50 lakhs per person. Compensation for loss of employment of fishers has only been partially settled. A renewed audit of all other deserving persons should be conducted and adequate compensation should be provided without delay. Compensation for additional travel costs resulting from beach erosion consequences must also be factored in and appropriate mechanisms should be devised for disbursement of the expenses to fishers. Where the imminent threat of loss or reduction of fishing opportunities are likely with the port coming into operation, the investment levels and the earning potentials of the fishers and the implication of loss of livelihood needs to be properly assessed by independent agencies and mechanisms for compensation worked out. The ISPS certification needs to be discussed with the fishing communities in an open and transparent manner to prevent it from being used as an alibi for restricting the rights of the fishers to live and livelihood.

***It is recommended that:** The Government should engage an independent agency to re-assess the current and possible future disruptions which can be caused for fishing communities in the operational and expansion phases of the port. Pressure should be applied on AVPPL to take appropriate measures, in consultation with the communities, to raise the funds and ensure timely and effective implementation of all current and future remedial measures.*

13. Shifting from Seawalls to Strategically Managed Coastal Retreat

We propose a strategic shift from seawall construction to a strategically managed coastal retreat for Kerala's coast. This is a less expensive and more sustainable alternative. The alternative approach is to establish a 200-meter setback line from the High Tide Line (HTL) as a 'total no-development zone,' for collective usufruct rights by registered fishers and enjoyment by citizens. Coastal Zone Management Plans (CZMP) guidelines are recommended to plan for long-term housing needs and basic infrastructure for fisher communities. The suggested solution involves gradual relocation from vulnerable coastal areas to safeguard ecosystems, resources, and livelihoods. 'Designed Villages' are proposed for planned resettlement, costing approximately Rs 30 crores for 100 households, which costs less than 1 kilometre of seawall construction which is Rs. 50 crores. To relocate 3340 vulnerable fisher families near the HTL, it would cost about Rs 835 crores, and for an additional 10,000 houses within 200 meters of the HTL, an estimated Rs 1300 crores. Recycling existing seawalls' granite for new community housing can reduce costs. The choice between seawalls and managed retreat should consider factors like coastal erosion, sea-level rise, community preferences, and available resources. Nature-based solutions are also recommended.

It is recommended that government should choose social infrastructure (housing) over protective infrastructure (seawalls) and constitute a “Coastal Community Housing Fund” for Rs 2000 crore with participation of government, public and private sector housing finance agencies. The government should use special powers for acquisition of land for this purpose paying market prices. Designed villages should have all community amenities, socio-cultural facilities, waste management and be planned with community participation, with structured involvement of all relevant departments, and logistic and financial support of the Government.

14. Preserving Sandy Beaches and Their Tourism Potential

It is very significant to note that sandy beaches are a source of substantial tourism potential which makes a major contribution to the State Domestic Product. Stone-walling the beaches results in huge loss of future revenues. By preserving sandy beaches, we are creating a balanced and sustainable approach to coastal tourism development; preserving the natural beauty, cultural heritage, and the overall quality of life for coastal residents and ensuring the usufruct rights to the beaches and seas to all citizens. Our estimate is that beach tourism in Kerala results in as much as Rs. 300 crores of potential revenue generation per annum. Moreover, if we continue to build seawalls, we cannot ensure the access to safe, sandy beaches for religious events like the Vavu Beli. Then there will be a potential revenue loss of at least Rs 200 crores per annum.

It is recommended that efforts need to be made to recover the sandy beaches by placing a moratorium of the construction of seawalls and leaving the beach to the natural processes of the sea. The Janakeeya Samara Samithi (JSS) should initiate alliances between the fishing communities, stakeholders involved in coastal tourism, and those concerned with cultural and religious significance of beaches, to push for a new policy for “Revival and Sustenance of Sandy Beaches”. This must be parallelly combined by resettling the active coastal fishing communities close to their occupational beaches but away from harm. Also promoting pesca-tourism initiatives that involve community participation and profit sharing can empower the local community and ensure their participation in and benefit from the tourism industry in the region.

15. The Conflict Between Port Development and Fishing Community Futures

Our report essentially points to the inherent conflict which exists regarding the perspectives and values about the beach and the coastal sea between those who wish to press for investments such as the transshipment port on the one hand, and the active fishworkers and fishing communities on the other. It is also necessary to set this conflict against the background of the new discourse on the Blue Economy which has found favour with our governments and industrial interests as the new frontier for economic expansion for materials and services to create more ‘economic growth.’ The Blue Economy's view of beaches and coastal waters encompasses four lenses: natural endowment, livelihood, business, and innovation. These lenses consider conservation, cultural heritage, economic impact, and technological advances. To succeed, it is vital to address power imbalances among stakeholders for a sustainable, inclusive, and gender-equitable Blue Economy.

It is recommended that the concept of Social License to Operate (SLO) offers a framework for resolving the conflict between the Vizhinjam port and fishing communities. The Janakeeya Samara Samiti, with the support of the local self-governing institutions and relevant community organisations, during the Public Hearing ordered by the MoEFCC's Expert Appraisal Committee (EAC) for the next phase of the port expansion, should demand that an SLO be constituted. The SLO focuses on building trust by aligning economic development with the cultural and livelihood importance of beaches and seas. The SLO emphasizes transparent communication, meaningful engagement, contributions to the well-being of communities, respect for local cultures, and fairness. It promotes a balanced and equitable approach, aiming to achieve social acceptance while minimizing conflicts and negative impacts. Though, the introduction of SLO in the Vizhinjam conflict may be belated, it is a measure which must be insisted upon by the Government if it is serious about an honest balance between live and livelihood of the fishing communities and the sustainable development of the port.

Beach or Port?

***Upon the shore where waves and seagulls roam,
A haven for fishers and hearts to call home,
No unsightly walls to mar the ocean's grace,
Let nature's beauty be the beach's embrace.***

***Fishermen's tales and laughter on the breeze,
With open shores and tranquil seas,
No looming port shall steal this precious shore,
Let's keep its magic alive forevermore.***

***A place for all, where families play and share,
Not hardened docks that mar the view so fair,
Let's stand united, protect this coastal treasure,
For fishers, public, and memories to measure.***

A Passionate Supporter

Appendix – A

UNIQUE BIODIVERSITY OF VIZHINJAM





Marine Biodiversity Register of Thiruvananthapuram by KSBB


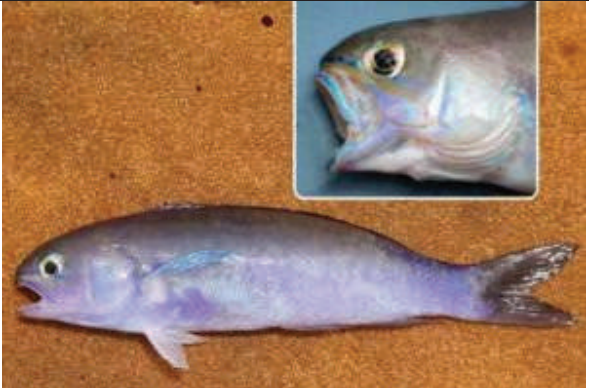
Preparation of Marine Biodiversity Register (MBR) along the Kerala coast started during 2013 and MBR of Thiruvananthapuram coast is completed in 2015. The MBR contains comprehensive information on availability of marine biological resources, their medicinal, food or any other use and information on coastal habitats, marine flora, and fauna along with associated Traditional knowledge (KSBB Web Source: KSBB Key Achievements of 2016- 2020). The study area is recorded as – from Kappil to Puthukurichy and from Valiyathura to Pozhiyur within the 12 NM of adjoining sea. This includes the sea and the seabed, the sandy beaches, estuaries, promontories, and cliffs. Vizhinjam port site is an important location within the study area. A key message is that 7.5 km of the Kerala's total stretch of 30 km of promontories and cliffs are located in the coast from Kovalam to Adimalathura (KSBB 2017).

The MBR demonstrates the following details with reference to the selected marine Biodiversity:

Phylum	Number of species
Seaweeds	30
Sponges	7
Cnidaria (Sea anemones, Sea Fans, Corals)	14 (4+3+7)
Molluscs (and Cephalopoda)	28 + 6 =34
Arthropods (Barnacle and Squilla, Sea crabs, Hermit Crabs, Lobster and Shrimps)	32 (1+3+17+ 2+ 2 +7)
Echinoderms (Sea stars, Sea lilies, Brittle stars, Sea urchins, Sand Dollar, Sea biscuit and sea cucumbers)	16 (7+ 1+ 3 + 2+1+1)
Fish Species	211
Sea turtles	3
Sea snakes	4
Marine mammals	3

A significant outcome of this study is that the recording of nine new species from the Kerala coast for the first time as follows:

<p>1) Sirembo jerdoni (Day, 1888) Brown-banded cusk-eel Order: Ophidiiformes (Cusk eels) Family: Ophidiidae (Cusk-eels) A benthic species found on the continental shelf. This is the first record of this specimen from southwest coast of India.</p>	
<p>2) Sand crab (Albunea systemma) First report from India</p>	
<p>3) Rediscovery of Indian ringed skate Okamejei powelli (Alcock, 1898) Order: Rajiformes (Skates and rays) Family: Rajidae (Skates) Very rare, small, poorly known demersal skate. First report from India</p>	
<p>4) Gymnothorax meleagris (Shaw, 1795) Order: Anguilliformes (Eels and morays) Family: Muraenidae (Moray eels) Common name: Turkey moray First report from Kerala</p>	

<p>5) <i>Heteromycteris oculus</i> (Alcock, 1889) Common name: Eyed sole Order: Pleuronectiformes (Flatfishes) Family: Soleidae (Soles) First record from Kerala coast; probably the first record from west coast of India</p>	
<p>6) <i>Hoplolatilus fronticinctus</i>(Günther, 1887) Order: Perciformes Family: Malacanthidae (Tilefishes) Common name: Pastel tilefish First report from Kerala</p>	
<p>7) Identification process for three species probably of the family Aulostomidae, Engarulidae, Zebrias sp is underway.</p>	
<p>Source: https://keralabiodiversity.org/marine-biodiversity-register/</p>	

Rocky reef ecosystems and their associated species and fisheries at Vizhinjam, compiled by FML research team in different periods of time with latest additions in 2021

ASPECTS OF BIODIVERSITY AT VIZHINJAM

Present scenarios on seabed ecosystems and marine fishery at Vizhinjam

15 rocky reef ecosystems

1. *Chenkalikkara kallu* (Vizhinjam rocky reef 1): This is situated about 6 m depth of the near inshore area of Vizhinjam port breakwater construction (between Vizhinjam fishing harbour and Vizhinjam port breakwater). Mussel collection was one of the fishing activities in the reef and shore seine fishing was also practised. After sedimentation/siltation, some portion of the reef was covered with sand.
2. *Kulathalkkallu paru* (Vizhinjam rocky reef 2): This was situated between 5.5 m and 15 m depth from the coast. Land location to this reef was between Vizhinjam Karimpallikkara mosque and St. Antony's shrine. Now this area is inside the Vizhinjam port construction area. After reclamation of sea to locate port super structures, few buildings were constructed on this rocky reef. This was one of the main livelihood areas of the mussel collectors. Shore seine fishing was also practised in its surroundings. Mussels, Lobsters, and some ornamental fishes used to be collected from this area.
3. *Karimpallikara kallu* (Vizhinjam rocky reef 3): This was situated about 10 m depth from the coast. Land location of this reef was straight to the Vizhinjam Karimpallikkara mosque. Now this area is inside the Vizhinjam port construction area. After the land reclamation from the sea, a high mast light is erected on this rocky reef. This again was one of the main livelihood areas of the mussel collectors and shore seine fishers. Mussels, chank (toad purpura), needle, squid, cuttle fish sardine varieties and many other varieties of organisms were reported from this reef. A shawl of fish was regular feature here.
4. *Kunnu paru* (Vizhinjam rocky reef 4): This was situated about 7 m depth from the coast. Land location to this reef was straight from the Vizhinjam St. Antony's shrine. Now this area is inside the Vizhinjam port construction. After the land reclamation from the sea, a second high mast light is erected on this rocky reef. This again was one of the main livelihood areas of the mussel collectors and shore seine fishers. Ornamental fishes and cuttle fishes and many other varieties of organisms were reported from this reef. Dolphins, whales and sea turtles were the regular visitors of this reef.
5. *Madam paru* (Vizhinjam rocky reef 5): This was situated between 11 and 13 m depth in the near inshore area. Land location to this reef was straight from the coast of Vizhinjam St. Antony's shrine. Now this area is inside the Vizhinjam port construction and stones for the horizontal breakwater are placed here. After the land reclamation from the sea, a second high mast light is erected on this rocky reef. Mussel beds are not recorded here since it is a muddy platform reef. This was main livelihood areas for many fishers including the boat seine fishers, hook and line fishers and shore seine fishers. Different varieties of fishes including kurthala, chathameen, valayodu were caught by the fishers. From the very deep sea, neduva fish used to come here and catch preys.

6. *Idichuparichan kallu* (Vizhinjam rocky reef 6): This was situated in an extension of about 22 m depth from the coast. Land location to this reef is an old resort which was seated between Mulloor and St. Antony's shrine. The height of the reef was a little higher in some areas and a little lower in some other areas of the sea. Now this area is inside the Vizhinjam port construction and stones for the horizontal breakwater are placed here. Mussel beds, chanks and different varieties of fishes were caught by the fishers. This was main livelihood areas for many fishers including the mussel collectors, boat seine fishers, hook and line fishers and shore seine fishers.
7. *Mulloor kozhipparu* (Mulloor rocky reef 1): This was situated between 11 and 15 m depth in the near inshore area. The present land location to this reef is one of the entrance gates of the port. One of the locations of corals in the Vizhinjam zone. A colony of tube worms are identified here. Some parts of the reef are muddy where abundance of fishes is recorded and other areas are rested with Mussel beds, chanks and other underwater species. Another important feature of the surrounding area with the depth of 24m is that the presence of many varieties of chanks like vassidae family. This was main livelihood areas for many fishers including the mussel collectors, boat seine fishers, hook and line fishers and shore seine fishers. After the port related dredging, mussel collectors were not able to catch good quality mussels from this area and some parts of the reef are already being covered with dredged sand deposits.
8. *Adava para* (Mulloor rocky reef 2): This is situated about 6 m depth from the coast and the present land location is one of the entrance gates of the port. During the low tide times, the outer layer of the rock was visible and high tide times, it was invisible from the coast. Mussel beds are very common. Seaweeds are visible at the adjacent promontory. Lobsters are another important species in the area. Mussel collection was one of the main livelihood practices here.
9. *Vellayam kallu* (Mulloor rocky reef 3): This is situated about 8 m depth from the coast and land location is the northwest of the Mulloor temple (Mulloor Thottam nagar Bhagavathi temple). Chanks (toad purpura) are very higher presence than mussels. Some of the organisms in this area are used for pharmacological research and products. This is covered with dredged sand or siltation/sedimentation after the dredging and land reclamation for the port.
10. *Aanakkallu* (Mulloor rocky reef 4): This is situated in the northwest of *vellayam kallu* about 5 m depth from the coast. Similar organisms like *vellayam kallu* are found here. There was a big rock with a height of an elephant in the area, this is the main reason for the term. This is covered with dredged sand or siltation/sedimentation after the dredging and land reclamation for the port.
11. *Avananka kallu* (Mulloor rocky reef 5): This is situated about 7 m depth from the coast of Mulloor and the earlier land location was near the Whiteman's house (*vellakkarante kettidam*). Mussel beds, Chanks (toad purpura), cuttle fish and *neduva* were caught in a higher quantity in the area. This reef is also covered with dredged sand or siltation/sedimentation after the dredging and land reclamation for the port.
12. *Idakkallu* (Mulloor rocky reef 6): This is located between *Aanakkallu* and *Avananka kallu* about 5.5 m depth. A group of rocks is assembled here. A type of seaweeds with brown colour grows here. Many varieties of fishes are caught from this area. This is now covered

with dredged sand or siltation/sedimentation after the dredging and land reclamation for the port and it may not be restored.

13. *Perumakkallu* (Adimalathura reef 1): This is the biggest rocky area which spread to almost all three directions from the coast in the Vizhinjam zone and located between 5 and 18 m depth in the near inshore area. Land location is straight from the Azhimala cliff where Azhimala shiva temple is located. It is important to note that there is sandy area in between the rocky reef of *Parumakkallu*. The heights are varied; lower ones, higher ones and semi or flat type ones. Mussel beds are very common. Lobsters are another important species in the area. Mussel collection was one of the main livelihood practices here together with other traditional fishing practices. *aluva* fish used to be abundant in the area and many other fishes too. The colony of *Neosabellaria clandestine* and bryozoans which were found by the earlier studies are almost in extinction now, after the dredging for the port constructions started. Underwater photography shows the dredged sand deposited over more than quarter of the area. Mussel bed is also impacted by the construction. However, still some organisms are left for protection and restoration.
14. *Ocham paaru* (Adimalathura reef 2): This is located in the northwest of *perumakkallu* and is found between 5 and 16m depth. Benthic features and other marine diversity including fishes are similar to *Perumakkallu*.
15. *lida ocham paaru* (Adimalathura reef 3): This is found between *perumakkallu* and *ocham paaru* and located at 7m depth. A group of rocks are assembled here. Similar species are recorded in this reef too.

Further Marine Organisms collected by FML (2013-2015)

The list of marine organisms collected by the FML study (2013-2015) – two locations; From Kappil to Puthukurichy and from Valiyathura to Pozhiyur including Vizhinjam port site

Phylum	Common Name	Number of species
Chlorophyta	Green algae	10
Phaeophyta	Brown algae	20
Rhodophyta	Red algae	10
Porifera	Marine sponges)	72
Cnidaria	Soft and black corals, Sea Anemones, Sea Mat, Stony corals	69
Platyhelminthes	Flatworms	39
Nematoda	Marine worms without legs	20
Sipuncula	Marine worms	5
Annelida	Scale worms, Tubeworms and other group worms	174
Mollusca	Chitons, Univalves, Bivalves, Nudibranchs	591
Bryozoa	Octopus and Bryozoans	30
Arthropoda	Crabs, Ambhipodes, shrimps, lobster, Barnacle	589
Echinodermata	Feather stars, Sea star, Brittle star, Serpent star, Sea Urchin, Sea cucumber,	371
Urochordata	Ascidians	17

Chordata	Blenny fishes, Gobby fishes, Fishes, Morays&Eels, Beach&Marine birds, Seasnake, SeaTurtle	210
Unidentified	Marine creatures	48
Total		2275

Published Studies on the Biodiversity of Vizhinjam Bay

There are many other studies documenting the biodiversity of the area which further confirms the importance of Vizhinjam coastal waters as a biodiversity hub. Some of these are listed below with details in brief:

Baiju, P.T., Prabhakaran, M.P., Benno Pereira, F.G. and Jayaprakas, V. (2016): This study has identified 232 fish species in the 26 near and inshore rocky reefs of three locations at Mulloor, Vizhinjam and Kovalam (11 rocky reefs) in Thiruvananthapuram during 2013-15. Vizhinjam was the most important site showing high species richness and abundance with more than 150 species and followed by Mulloor with more than 40 species. Overall, these species belong to 2 classes, 16 orders, 62 families and 114 Genera. Vizhinjam and Mulloor together (Vizhinjam port site) formed more than 200 fish species diversity. The highest number of species in the Vizhinjam port site was found in the order of Perciformes with 120 species and followed by Tetraodontiformes (9), Anguilliformes (8), Scorpaeniformes (7), Pleuronectiformes (5), Beryciformes (4), Siluriformes (3), Torpediniformes and Myliobatiformes (2 each), Orectolobiformes, Aulopiformes, Ophidiformes, Lophiformes, Mugiliformes, Atheriniformes (1 each) and there were 33 species Mullur. As per the IUCN (International Union for Conservation of Nature) Red List Categories, 2% species were considered near threatened and endangered, and vulnerable categories are 0.1% each. The study results demonstrate that rocky reefs support a high ichthyofaunal diversity. The physical structure of the reefs supports the ichthyofauna as shelter, nursery ground and food source. Like many previous studies on the topic, they have identified many species like seaweeds, sponges, bryozoans, molluscs, annelids, ascidians and many other important species. Ecological and biodiversity importance of these species are yet to be confirmed. Ray Finned fishes, bony fish, variety of eels, bass, gobbies, perches, wrasses, barracudas, angelfish, butterfly fish, blennies, basslets, groupers, catfishes, pearl fishes and many more variety of fishes were recorded in their study. For a comparison, the study revealed a very higher presence of fish varieties in the Vizhinjam seaport site than the studies on coral reefs of the Gulf of Kutch, Gujarat.

Sluka (2012): The rocky reef fish diversity of western coast of India from Vizhinjam to Muttom (Tamil Nadu) was documented and reported a total of 184 species within 41 families, 12 of which (6.5% of all species observed) appear to be new records for India. Mary, Sluka & Lazarus (2011) recorded Vizhinjam as one of the diverse sites with 7 species of octocoral fauna and the diversity is ranged from 6 –13 species. The study reports 14 species of octocorals from six families and 10 genera in the five study sites including Vizhinjam. Octocorals are a small proportion of the rocky reef fauna of south-western India. In an earlier study by Mary (2003) reported that Vizhinjam site is abundant with gorgonids (seafans) of 15 species. The study also noted that these species have great pharmaceutical potential.

Ravinesh and A. Bijukumar (2011): Data were gathered from two close localities at Kovalam and Vizhinjam to assess the intertidal biodiversity associated with natural rocky shores during January to December 2010. Like many previous studies, many species like seaweeds, sponges, bryozoans, mollusks, annelids, ascidians, and many other important species have been identified. Ecological and biodiversity importance of these species yet to be confirmed. According to them, biodiversity richness is significantly higher on the natural rocky shores.

George, Van Soest, Sluka and Lazarus (2020): A taxonomical analysis of marine sponges (porifera), which were collected between 1999 and 2005 from 19 stations along the east and west coasts of India including Vizhinjam natural rocky sites were conducted under this study. A total of 101 species identified by the study, Vizhinjam reported relatively good diversity of sponges with 42 species (to date 9572 valid species, both marine and non-marine, of sponges are enlisted in the World Porifera Database) and three of them were recorded only for the first time in India. This identification is limited due to the poor visibility of only 3- 5 m depth. Considering the ecological importance of sponges like promising sources of therapeutic drugs including cancer treatments, chemical research due to their toxicity properties and their plasticity of growth forms useful to study environmental fluctuations, the researchers advise these sites should be considered for the marine protected areas (MPA) and adequate regulations should be imposed upon these sites to protect richness in sponge diversity along Vizhinjam. In a similar study by Vinod et al (2014) identified rocky reefs off Adimalathura and Vizhinjam (both come under the present Vizhinjam port site) with abundant brown mussel population in shallow waters of depths ranging from 10 to 30 m; many sponges were found attached to the brown mussels. In both areas, marine sponges were in the orders of Poecilosclerida, Haplosclerida, Hadromerida and Keratosida. Vinod et al (2014) found that the two stations are characterised by patches of corals, rocky stretches and mussel beds which would probably be assisting in easy settlement of the larval forms and better colonisation of sponges. However, depth wise exploration of sponges in these sites has not been conducted yet to shed more lights on distribution, composition, and diversity of marine sponges.

Chandrasekar et al (2019) studied diversity of Echinoderms in rocky reefs areas of the southwest coast of India from Goa to Kanyakumari and recorded the presence of 14/15 species of echinoderms in the Vizhinjam site except comaster schlegelii. They were enlisted representing 12 genera, 10 families, 8 orders and 5 classes.

Scientists from Central Marine Research Institute (Vinod et.al. 2019, Jasmine, et. al. 2019, George R.M, et.al. 2019) have also reported the diversity of stony corals, sponges and reef fishes in Vizhinjam coast and coastal waters which was once considered as the occurrence of coral reefs along the south-west coast of India in general and Kerala coast in particular was once thought to be meagre to non-existent.

Appendix -- B

ON A NEW APPROACH TO HOUSING FOR FISHING COMMUNITIES

The contents of this Appendix are taken from (G. Jaigopal ,1998: CRZ and an Alternate Vision for Coastal Villages) It was included in the report on “**Social Protection for Fishworkers**” submitted to Kerala State Planning Board, 2022

Model Villages

During the 10th Five Year Plan a National Fishermen Welfare Assisted Housing Scheme for model villages was initiated by the Union Government. These schemes were active until 2015. However, the extent to which these measures have been integrated into the actions of the current Central Government initiatives is not clear.

There is scope for making attempts to create a whole model designed village²⁵ under the auspices of a few grama panchayats where land is available and the fishing communities are willing to make a collective transition to a new location which is better planned and close to the sea.

Presently several fishing villages do not have drinking water for all, there is lack of sanitation, health centres, schools, anganwadis etc. and there is inadequate space and possibility for building houses along the coast to accommodate the natural growth of population of the coastal dwellers.

Such villages may be identified and the villages may be motivated with the following approach for the Grama panchayats to implement.

A New Approach

a) Depending on the number of affected people, a village by itself or two or three adjoining villages can together acquire land required for setting up the basic infrastructure for a totally new "designed village" beyond the 500m High Tide Line.

b) The "Designed Village" will have proper organised circulation by a central wide and paved all weather road with a "village square" in the centre, from where it will radiate to open space which are access ways to individual plots. There is also a paved road leading to the beach from the village centre for fishermen to transport their accessories and catch.

c) The new "designed village" will have plots of size varying from 2.5 cents (100 sq.m) to 6 cents (240 sq.m) with commercial plots (for shops, workshops etc.) adjoining the main road.

²⁵ The village of Marianad in Trivandrum District is the earliest example of such an initiative taken by the Trivandrum Social Service Society in the early 1960s. The village is today a good example of what creative foresight and genuine people's autonomy and participation in development can achieve.

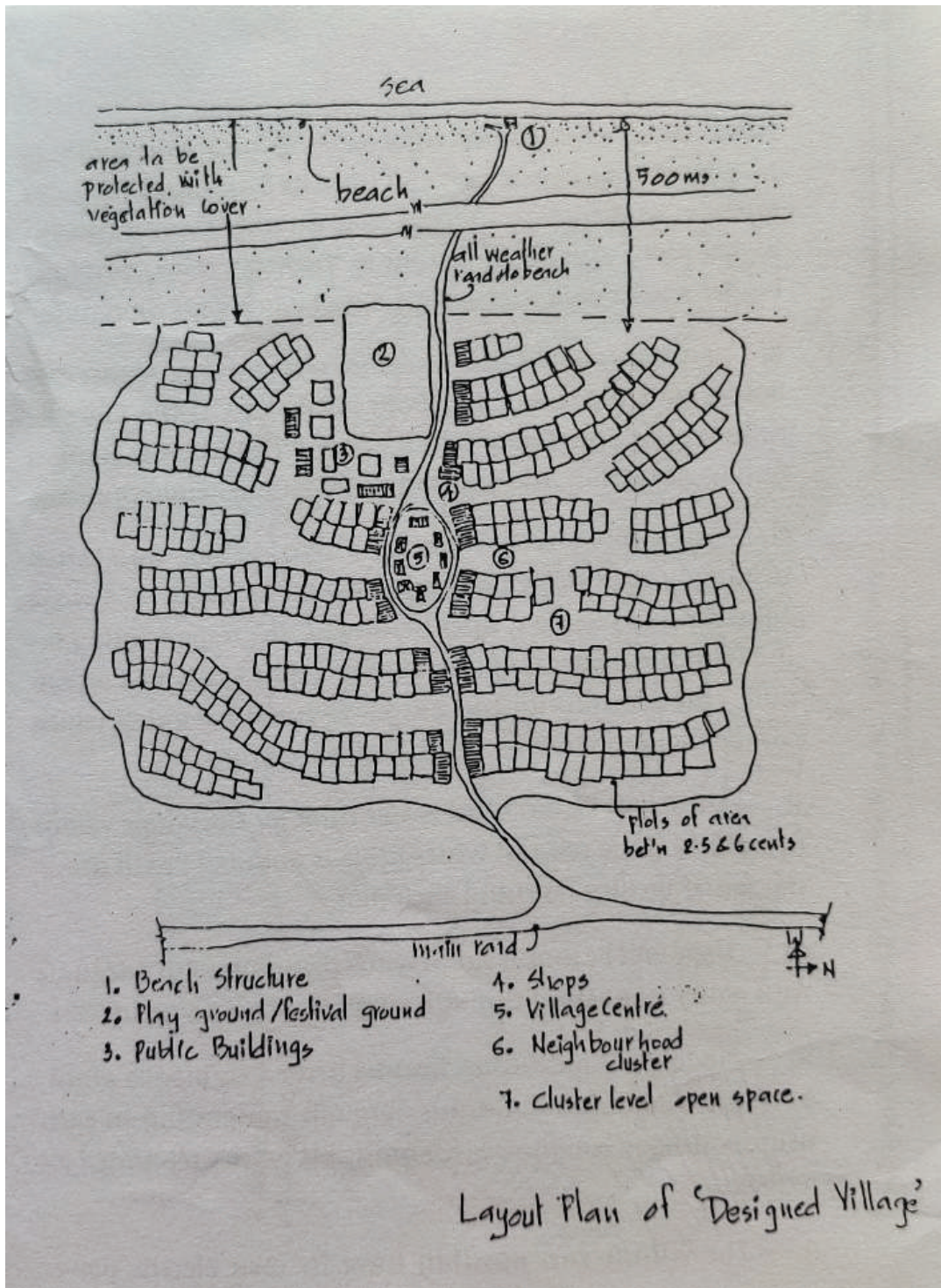
- d) Thus, even the smallest of pieces of land after building a 250 sq.ft. core house, can still have its own small vegetable garden, and enough space to take another room later. The bigger plots, may be adjacent to the main road, can have bigger houses or houses with shops or workshops alongside.
- e) Each neighbourhood cluster has a central open space and houses on either side. This front open space is the place for drying fish or other produce, space for children to play as well as gardening and relaxing space for the neighbourhood.
- f) Each plot will have its own toilet and each neighbourhood cluster will be designed to collect its waste effluent and release it after treatment -- the responsibility being with the residents of that cluster. (If suitable and acceptable, the community can opt for composting toilets which can be more effective, scientific, and less costly). There will be a central water tank for the whole village (especially if the ground water table is polluted) with drinking water facility reaching each plot.
- g) There will be proper storm water drainage with adequate rain water harvesting through wells and ponds
- h) Biodegradable wastes may be treated in biogas plant or made into organic manure through composting in each neighbourhood and non-biodegradable wastes separated for recycling.
- i) The village can possibly have its own electric power generation (at least to complement the supply from the grid) by means of tidal power, wind, solar or other renewable sources.
-) The village square shall have a gathering space with facilities like banks, post office, PHC, primary schools, secondary schools, community centre, fishery office around it.
- k) If planned optimally, a square km. of area can accommodate a population of 16500 people (3300 households) comfortably with all these facilities.
- l) The cost of building such a village infrastructure can on an average be assumed to be Rs. 8 lakhs for a 575 sq.ft. house and proportionately less for smaller houses.



Figure: A 575 sq.ft house with staircase and terrace.

m) Thus, if on an average in one village, around 200 families are affected, then, the two adjoining villages together can build infrastructure for a new designed village of 400 units which would cost around Rs. 25-28 crore.

n) Land needed for 400 units would be around 30 acres including all the above said infrastructure facilities (average of around 7.5 cents per unit)



How it will take shape?

- a) Each Grama Panchayat will have to make a survey as to how many households are adversely affected by CRZ regulations etc.
- b) Then it could make a detailed project report including costing and land required (if possible, along with co-operating neighbourhood grama panchayat) to build a totally new "designed village" for those to be rehabilitated together with provision for future expansion.
- c) The Grama Panchayat can then approach the Government through the (Coastal Management Authority) for a soft loan to implement their project. The CMA after examining the project proposal may forward the loan in instalments whereupon the Grama panchayat can acquire land and commence construction of the infrastructure for the new 'designed villages'"
- d) The Grama Panchayat can then channelize all further housing and other constructions such as those under LIFE and other Schemes for underprivileged sections, to be built in the new infrastructure of the "designed village". Also, all new schools, hospitals, anganawadis etc. must be built here so that this becomes the new magnet for development in that village.
- e) Those who come under economically weaker sections will get a minimum of 2.5 cents (100 sq.m) land and a 250 sq. ft 'core house' (free or subsidized according to government's housing schemes) in the 'designed villages' upon surrender of proportionate land in the CRZ area to the Grama Panchayat.
- f) The Grama Panchayat can then sell the bigger development plots and commercial plots in the 'designed villages' for those wishing to set up new ventures, either for an enhanced value or in exchange of larger plots in the CRZ areas
- g) The Grama Panchayat can then take up the responsibility of protecting the acquired land in the CRZ area and can motivate the people, especially the unemployed to grow local species, plants, trees, mangroves, herbs etc. which are beneficial to the stability of the coastal ecosystem; and from which sustainable livelihood could be procured. It can also motivate people to rejuvenate the ground water resources by digging up ponds; which would also help improve fresh water fisheries. If organized well, along with several other activities, a truly motivated Grama Panchayat should be easily able to repay the loans in a few years' time.
- h) Instead of spending large amounts of money for building sea walls, the grama-panchayat can motivate land owners along the coast to grow the local species of plants, mangroves etc. which while protecting the land and its inhabitants would also enhance the ecology of the region together with the possibility of earning revenue for themselves and the grama panchayat.

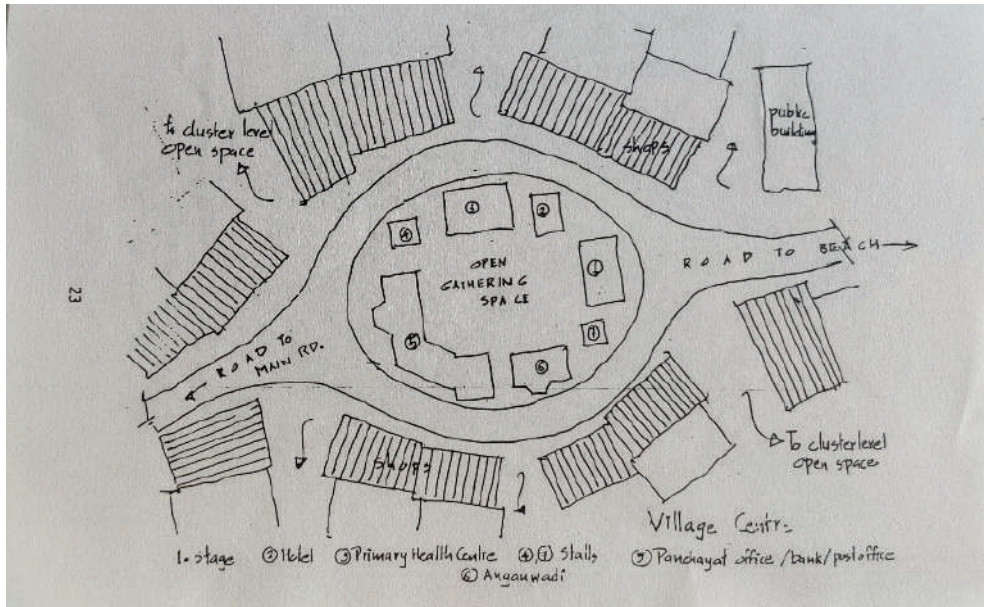


Figure: Plan of a Model Village

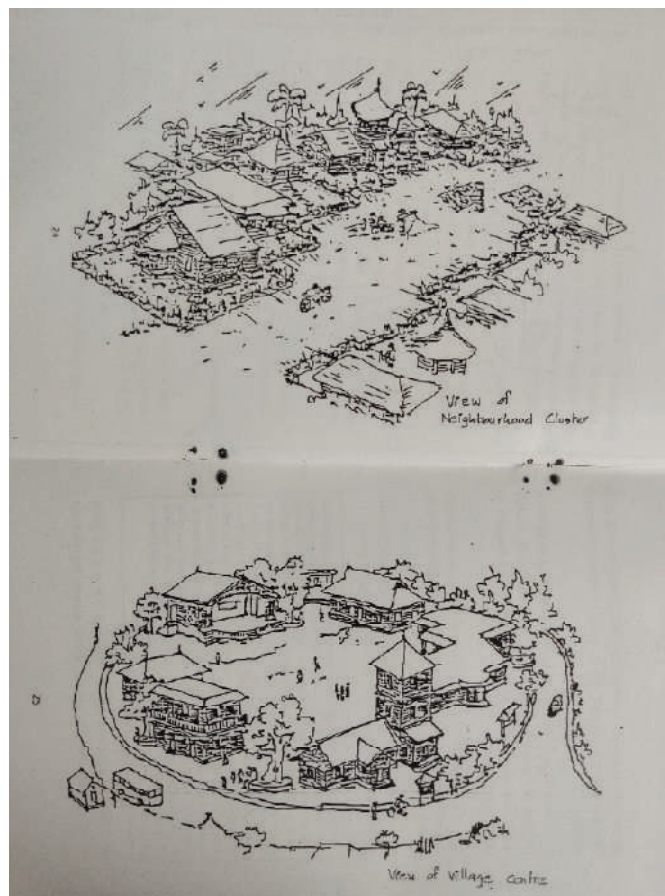


Figure: Village Centre

An Integrated Vision

The pattern of development of each village will depend on several local factors such as the geography, the economy, occupation of the people etc. Hence there will never be a standard approach – each village had to be carefully studied and based on which a master plan will have to be evolved after several rounds of discussions. While the above guidelines for planning could broadly show the direction of possible growth for new villages in majority of the regions, some villages like Chellanam or Mulavukad in Ernakulam district have their own geographic peculiarities (they being long narrow peninsulas) where a different approach might be necessary. Also, the development pattern of such region as Vypeen and the nearby islands could be influenced by that of Ernakulam city – hence a different approach might be necessary there, the villages near the Rare Earth Factory in Chavara might need to have a varied approach, and so on.

Municipalities and corporations could also embark on similar ventures in their respective regions. Hence while the basic approach can be the same, the scale may be larger. There can be a new approach for the urban centres, a new approach towards tourism, a fresh suitable and modern approach towards all aspects of development.

Appendix - C

PHOTO ESSAY ON VALIYATHURA BY T.A. AMEERUDHEEN (2017)



The National Centre of Earth Science Studies (NCESS) building in Kerala's Thiruvananthapuram district was damaged by sea erosion.

Did the NCESS knowingly choose a coastal location prone to erosion, potentially unable to predict how the sea would behave post the construction of local coastal structures like the Vizhinjam port south of its site?



Beach erosion destroyed hundreds of homes in Valiyathura fishing village

Is this survey stone not the NCESS High Tide Line (HTL) marker? Or did they place it in the wrong location??



A view of the Valiyathura village from the top of the pier.

How it looks to live behind a seawall!! There is a false sense of protection.



Destroyed homes in Valiyathura fishing village

And when the sea breaches the sea wall, this is what happens to the houses!!



Groyne construction in progress in Valiyathura.

And when seawalls (which are parallel to the shore) collapse, the response of the government, supported by the engineers, is to build groynes – which are perpendicular to the shore, triggering both erosion and accretion again!



Fisherman Anil Babu asks: What will happen to Valiyathura when Vizhinjam port becomes fully operational.

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