

Sustainable Rehabilitation Planning for Coastal Regions Affected by Black Sand Mining

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Abstract: *Alappad, a coastal island situated in Kerala, India is undergoing significant damage and is gradually losing its environmental and social sustainability. The nearby panchayats of Alappad are Clappana and Kulasekharapuram panchayats, which are closely interconnected with Alappad in case of services and the negative impacts on Alappad panchayat will indirectly affect these panchayats also. Here the study area I have taken is Alappad, Clappana and Kulasekharapuram panchayats. I have carried out a socio economic vulnerability assessment of the area through primary surveys and with secondary data collections..This paper is based on formulating strategies for the black sand mining affected area for carrying out a sustainable mining. The study focused on social, environment and economic impacts the black sand mining caused in Alappad.*

Keywords: Alappad, Black sand mining, Kerala coast, Sustainable mining, Mineral sand mining

1. Introduction

Here, Alappad, a coastal island situated in Kerala, India is undergoing critical damage and is continuously losing its environmental and social sustainability. The area is blessed with very rare and precious black mineral sand deposits. Sand mining for these minerals started in 1911 and is still continuing. But, unfortunately many of the problems that Alappad faces now, have its root on mining of this mineral sand. The land area is continuously diminishing due to sea erosion. The mining has also caused displacement of people and environmental degradation. Marine life also is getting affected by mining on beach and pollution. The inhabitants are fishermen who are largely dependent on the eco-system for a living. Therefore, loss of environmental sustainability

subsequently affects social sustainability too. The mining could have already done many damages beyond come back.. This was one of the most affected areas of the 2004 tsunami and the environmental degradation has further increased the vulnerability. Alappad which had an area of 89.5 sq km in 1955, has shrunk to just 7.6 sq km now. (Indian Rare Earths, 2018) The continuous mining of mineral sand by IREL over the past many years has submerged 20, 000 acres under the sea. Mining is continuing here in 82 acres. Today it risks being encroached by the sea and threatens to displace over many families off their land and livelihoods. Protest against the mining companies began with a fight for labour and land issues like better compensation for the land and employment in IREL in 1990's.



Figure 1: Alappad mining area

The area of village has shrunk from 89.5 sq km to 7.6 sq km in 20 years. That means over 20,000 acres of land has been swallowed by the sea and if the mining continues, Alappad panchayat will be completely wiped off from the map. In 2004, roads to the site were blocked by protestors who demanded that the sea washing be stopped, sand be refilled, and scientific dredging be employed. This led to the closure of the sites for about 2 years. In 2011, there was another attempt to organise and streamline the protests against the mining companies through social media. Around 2017, these protests that were happening over many years were consolidated. The extremely popular social media campaign “#Save Alappad, Stop Mining” followed. The 10,000 fishermen who live in the village risk a loss of livelihood if Alappad goes under the sea and the negative impacts will be there in the nearby panchayats of Alappad i.e. Clappana, Kulasekharapuram and Karunagappally municipality which will get affected socially, economically and environmentally.



Figure 2: Save Alappad Campaign



Figure 3: Villagers forming human chain

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“#Save Alappad, Stop Mining” followed. The 10,000 fishermen who live in the village risk a loss of livelihood if Alappad goes under the sea and the negative impacts will be there in the nearby panchayats of Alappad i.e. Clappana, Kulasekharapuram and Karunagappally municipality which will get affected socially, economically and environmentally.

The study was conducted in order to understand how the black sand mining has affected the socio economic vulnerability of an area. If carried out in a sustainable way with stakeholder involvement and proper spatial planning, it can contribute to the GDP of the country without affecting the indigenous population negatively. The focuses on understanding the concerns related to the resource utilization, environment and the indigenous community staying there. The potentials of the study area has been identified and the suitable strategies are formulated.

2. Aim, objectives and scope of the study

Aim of the study is “To formulate planning strategies for Alappad coastal region by identifying the sensitive areas so as to reduce the negative impacts of black sand mining.”

The objectives of the study are:

- To carry out socio economic and environmental vulnerability assessment of the study area through primary survey and secondary data collection
- To explore the successful practices adopted in sustainable sand mining, land reclamation and biodiversity restoration in National and International levels through case studies.
- To formulate planning strategies and proposals which are environmentally, socially and economically responsible.

The scope of the study is that collecting and analysing the data of the study area helps to assess the socio economic vulnerability of the inhabitants and thereby helps to prepare a sustainable plan. The study output will be beneficial for authorities and stakeholders involved in environmental protection and social area development and tourism planning processes. The study is also beneficial for the mining agencies and the public to understand the issues faced by the inhabitants of the study area due to black sand mining.

3. Methodology

The significant undertakings in the primary stage is to limit the exploration point, read scholastic materials, plan the detailed research measures, select suitable strategies, outline research questions, arrangement of overview structures and study region depiction. This will also include the literature studies of similar projects and the detailed background study of the study area. Literatures regarding green infrastructure planning, using remote sensing techniques in mapping and sustainable mineral sand mining were studied. Three literature studies were done on the similar kind of black sand rich areas of Kerala which got affected negatively due to the mining.

In the second stage the fieldwork was conducted. Major

tasks in this stage were interviews, surveys and search for relevant secondary data from the concerned authorities. Both primary and secondary data were collected. Primary data was obtained through questionnaire survey among the respondents. Secondary data were gathered through published materials, journals, articles and internet.

The major task in the last stage was to analyze the data and other materials and to identify the potentials and issues of the study area.

4. Study Area

The study area includes Alappad panchayat and the nearby panchayats of Kulasekharapuram and Clappana and the Karunagappally municipality. The study area is 24 km north of Kollam and 60 km (37 mi) south of Alappuzha. It lies in the Karunagappally taluk. The taluk is bound on North by Kayamkulam, East by Kunnathur taluk, on the South by Kollam and on the west by Arabian sea.



Figure 4: Methodology of the study

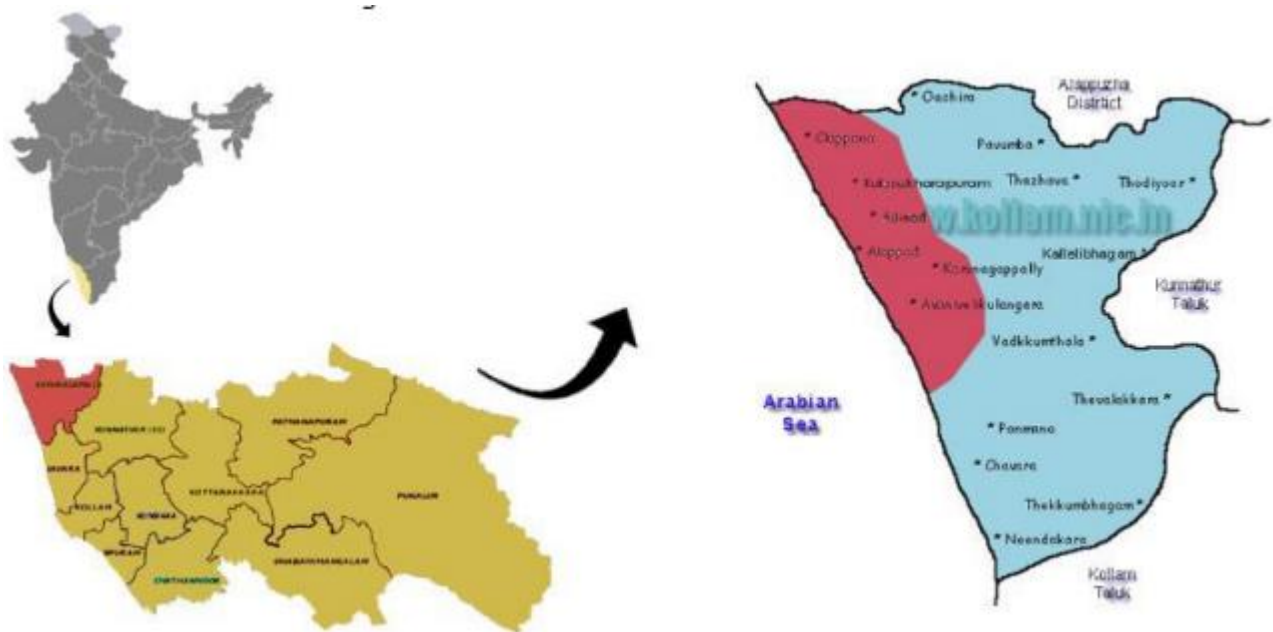


Figure 5: Study Area Delineation

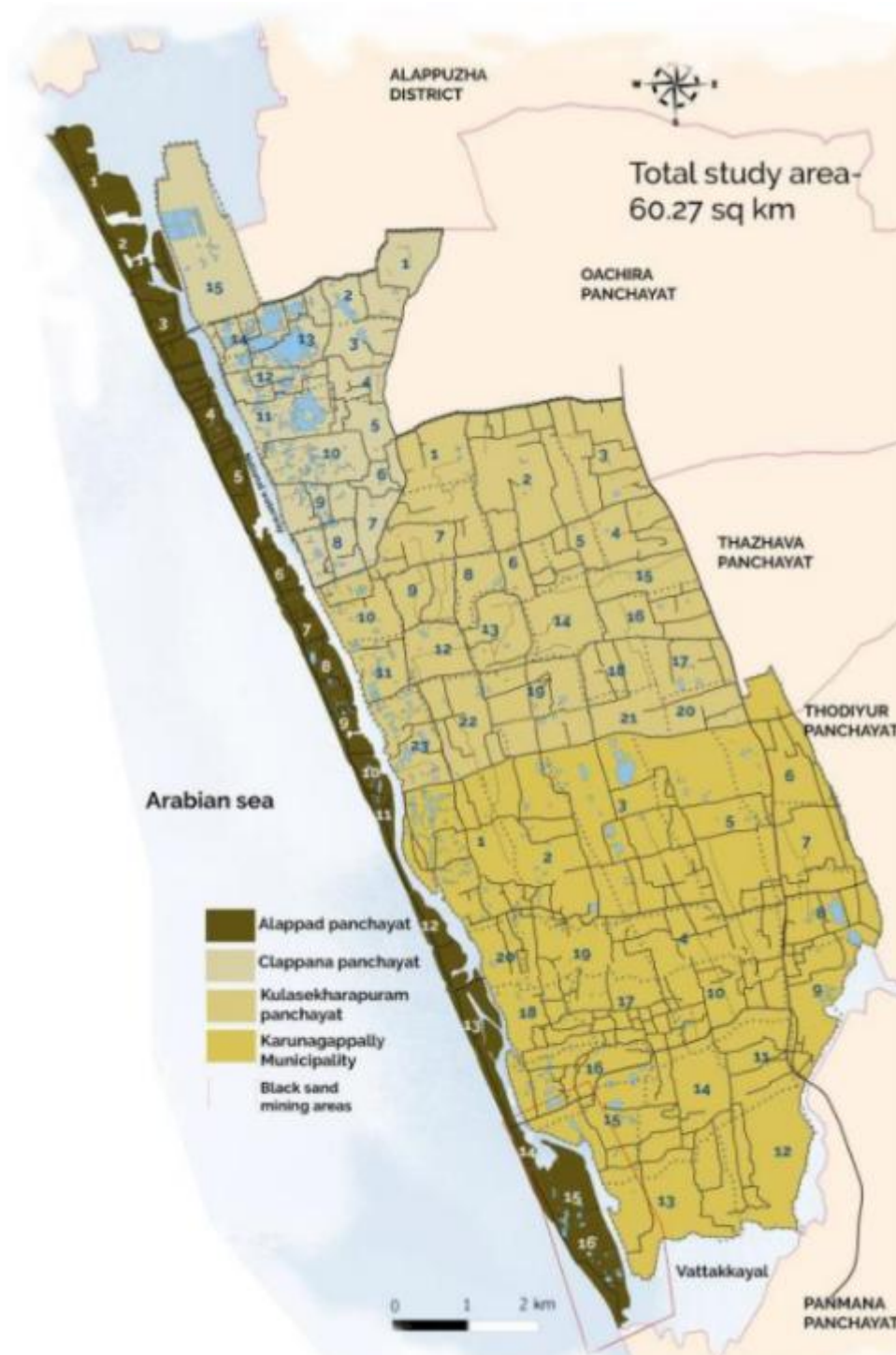


Figure 6: Study area

The total study area is 60.27 sq km. The reasons for the delineation of the study area:

- The North of the study area is marked by Alappuzha district and the South is marked by Chavara block.
- Alappad area has a strong inter connection with Karunagappally Municipality, Clappana panchayat and Kulasekharapuram panchayat. The services to Alappad are mainly from these three areas.
- Alappad is an island and it has only two exit roads outwards, one is through Clappana and other is through Karunagappally municipality
- In 2004 after the occurrence of tsunami, the affected people were rehabilitated to the tsunami colonies of Kulasekharapuram panchayat and Karunagappally municipality and these are fishermen communities. They travel daily to Alappad area for their livelihood.
- The Clappana panchayat is rich with mangrove forests 'Aayiramthengu mangrove forests'. These consists of 9 mangrove species belonging to 6 families.
- The Kulasekharapuram panchayat is also rich in wetland areas and these to panchayat covers CRZ I category.
- Alappad is experiencing coastal erosion as an impact of black sand mining and if Alappad vanishes off due this, the sea water gets intruded into the back water area and the impacts has to be faced mainly by these 3 areas.

5. Analysis of the study area

Today it risks being encroached by the sea and threatens to displace over 5000 families off their land and livelihoods. Protests against the mining companies began with a fight for labor and land issues like better compensation for the land and employment in IREL in 1990s. The beaches in this area are subject to seasonal erosion and accretion. The impact of unsustainable mining activities in the area including the loss of land resources, traditional fishing, and habitats, deprivation of the natural coastal protection, altered coastal microclimate, aggravated beach erosion, and effects on the recreational/ cultural aspects of the community.

It also affected the rituals and local practices of the community. For example, the localities are not able to practice Kambavala, a method of fishing using the coast to lay the nets. A lot of people who were dependent on foraging seafood including mussels and crabs off the coast have lost their source of food and income too. The 10, 000 fishermen who live in the village risk a loss of livelihood if Alappad goes under the sea.

The mining has also caused saline water incursions into the area making it unfit for cultivation of any kind. Moreover, if the sea links with the backwaters for even more than 5 meters, the rate of intrusion of the sea water will be unpredictably large. This will render the national waterway TS Canal useless and will also affect the land and people beyond Alappad.

Table 1: Alappad panchayat area

Type of population	Rural
Affected population	20000
Start of conflict	1992
Mining companies	IREL, KMML
Environmental impacts	Soil erosion, reduced ecological connectivity, biodiversity loss, food insecurity, soil contamination, ground water pollution, landscape loss, beach erosion
Socio economic impacts	Loss of traditional knowledge, loss of livelihood, loss of culture, loss of fishing jobs, forced migration

Demographic analysis: The population growth rate of Alappad has decreased while that of Karunagappally and Kulasekharapuram increased due to the migration of people from Alappad to these areas. Availability of land at a cheaper rate at Kulasekharapuram may be the reason for high growth rate. The steep increase in value of land and higher living cost has forced ordinary people migrating to other local bodies from Karunagappally Municipality.

From the analysis it is observed that the WPR in the study area is less than 40%, which is preferred for a balanced economy. Analysing the occupational structure, it is seen that share of main workers is high which will aid in the overall development. The share of marginal workers is comparatively low. The rate of increase of main workers is less than that of marginal workers. The rate of increase of main workers and marginal workers has decreased from 2001 to 2011.

This major shift in employment pattern shows a lack of interest towards primary sector, due to the reduced output from those sectors. In Alappad there is a huge occupational shift from primary sector to the tertiary sector.

Land use analysis: Majority of the total area is utilised for residential purposes. More than 8% of the total area is covered by environmentally sensitive water bodies. The CBD is civil junction and market junction. Commercial activities are concentrated mainly along the sides of NH and along Karunagappally-Sasthamkotta road. Industries occupy very small area of 3 hectares, which is only 1% of the total land area. While comparing industrial and commercial land uses, it is seen that land under commercial land use is higher, indicating the domination of tertiary sector over the secondary sector. More than 90% of the workers engaging in non agricultural pursuits indicate that the agricultural land is either unutilised or utilised for other purposes.

Residential land use is increasing at the cost of vacant land and paddy fields. When compared with other municipalities in the district, it is seen that Karunagappally has higher share of commercial activities and lowest share of industrial and agricultural activities. Alappad area has very less commercial land use. The residents depend upon the Karunagappally municipality for the shopping and all. No new development of commercial centres can be suggested in Alappad as the land is a narrow piece of land and also it falls under the CRZ III category. The land use for public and semi public places are also very less in Alappad panchayat.



Figure 7: Land use of the study area

Socio economic analysis: Shortage of modern academic facilities, infrastructural facilities and lack of open recreational facilities for the mental and physical motivation of the students are the major problems facing in all educational institutions.

Higher literacy rate can be seen in the study area. Alappad has desired number of schools. When the study area compared with planning standards it is seen that facilities are deficient in the level of professional education. Priority must be given to the education of the differently abled children through positive government initiatives. Alappad has Government Fisheries HSS and a Vocational higher secondary school for the improvement of the fishermen community. Students from the nearby areas depends upon the vocational higher secondary school in Alappad as it is the only Vocational HSS in the study area and so the environmental degradation of Alappad will have a negative impact on their studies.

Alappad and Clappana panchayat has no hospital facility. The people of Alappad has to travel more than 10km distance to hospital. Alappad has sufficient number of PHCs and family health care centres. There is an absence of a super speciality hospital is there in the study area and also absence of effective functioning labs.

Socio economic survey analysis of Alappad:

The socio economic survey of Alappad wards 15 and 16, the mining area was conducted as a primary survey and telephonic survey. 30 households samples were collected. In the study area more than 200 families reside. The main objective of the survey is to assess the extent of socio-economic impact of sand mining in the lease area and its surroundings. Many of the residents had lost their jobs due to the forced migration from the area.

A large number of the respondents were engaged in fishing and this work is interrupted to a certain extent through mining in the locality. Hence, they are not able to get regular income which reduces their income. This point may be noted and seriously considered. Survey shows that almost all of them have availed the land as inherited. It is clear that their families are living here for years and years ago. Traditionally, they are living here and engaged in their own occupation. And they are socially and culturally accustomed to this area. The sentimental attachment of the people of this soil necessarily compels them to stay here. So, care and caution may be taken while evacuating them from this area. About 200 fishermen families were displaced due to 2004 tsunami and they are in the tsunami colonies of Kulasekharapuram and Karunagappally and currently they have to travel daily to Alappad for their livelihood.

Environmental analysis: Accumulation of solid waste in wetlands, ponds, streams and backwaters is an important issue. Reclamation of the paddy fields in the study area is another important issue. If the coastal erosion of Alappad continues, the village will get wiped out and as a result the nearby panchayats and the municipality area will get directly exposed to the tides and salt water intrusion will take place which will destroy the crops. Water scarcity is near the mining stations which are as a result of the mining activities. The study area includes CRZ IA areas, which needs special protection, proper planning must be undertaken so that the mining activities won't destroy the mangroves. The shore areas are facing frequent tidal attacks.

6. Strategies

The strategies formulated are based on sustainable mining. These are arranged as environmental strategies, social strategies and economic strategies.

1) Environmental strategies:

- **Exclusion of specific zone:** It is desirable to exclude specific zones for black sand mining, the sensitive areas like mangroves. No dredging in specific periods: Not carrying out black sand mining during specific seasons, months or tidal period can be a way limit the coastal erosion.
- **Applications of production limits and water quality criteria:** During sand mining, the increase in concentrations of suspended sediments determines to a large extent the effects on the ecosystem. So limits must be put on the daily production levels of dredging process.
- **Monitoring ecosystems:** Field monitoring of sensitive habitats before and during the dredging works can be done by means of temporary or permanent measuring systems, geospatially and sensors so that the predicted effects can be verified.
- **Restoration:** As a consequence of blacks and mining, local benthic communities and ecosystems will be slowed down in their development or will be partly or completely destroyed. So after the completion of the dredging process, to speedup the recovery process, the deep dredged pits shall be filled up with sediments.

2) Social strategies

- **Involvement of indigenous people:** The local community must be involved and their opinions and culture must be taken into account.
- **Engagement of stakeholders:** Stakeholders are any and all entities who have interest in black sand mining or those could be affected by the actions of black sand mining. The stakeholder's interest must be taken into account.
- **Preservation of traditional knowledge:** The traditional knowledge of the people should be considered. Training centres can be opened up by the mining agency in order to preserve and promote it.
- **Identification of vacant government plots for housing:** As the land values are increasing day by day, the migrating people from Alappad for black sand mining finds it difficult to find a housing area for them until the lease period ends. So in such a case, if vacant government plots are identified and are provided with community housing, it will be helpful for the rehabilitation of the migrating people.

3) Economical strategies:

- **Create more employment opportunities:** More employment opportunities must be provided to the local communities. They have to be included in the mining stages and must be paid so as they are also benefiting from the process.
- **Strengthening of traditional industries:** Exhibition cum trading centre should be set up for the traditional industries. Strengthening of handloom units can be done and collection of coconut husks with the help of kudumbasrees can be implemented. Coir manufacturing

units can be set up and the exporting of coir products can be promoted.

- **Indigenous business development fund:** Indigenous business development fund can be provided by the mining agencies in order to promote the local communities.
- **Arranging business training programs:** Business training programs can be arranged for moulding the fishermen community.
- **Development of tourism:** The study area is rich in scenical beauty and has many tourism spots. The people of Alappad are interested in a tourism development as it can contribute to their income more.

7. Conclusion

In view of vital role that the mining sector plays in job creation and poverty alleviation, it is important that due recognition is given to this sector by central government and local authorities. There needs to be a move towards a culture of wealth generation and to draw the mining sector into the legitimate social fabric of the country. The miners has to be inspired as entrepreneurs, not to constrain and hinder them. Miners should be encouraged to act within the legal structure, with due regard to health, safety and the environment.

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