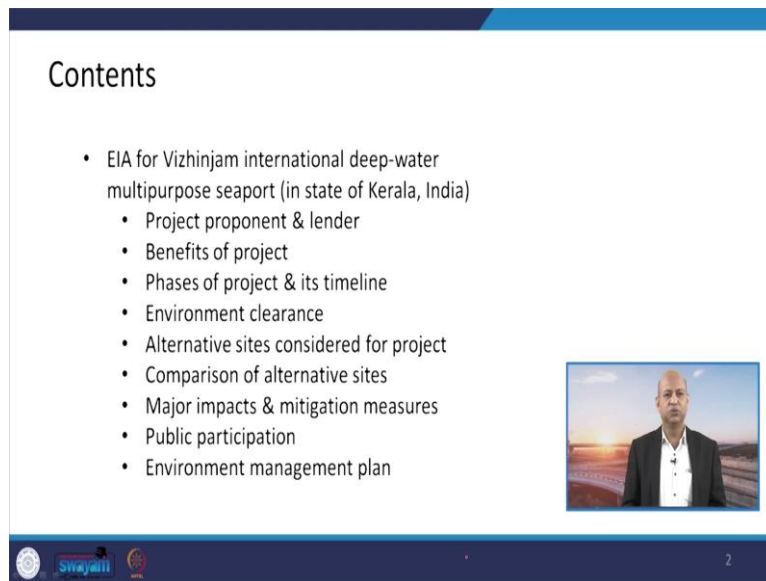


Sustainable Transportation Systems
Professor Bhola Ram Gurjar
Department of Civil Engineering
Indian Institute of Technology, Roorkee

Lecture 21
EIA Case Study - V

Hello friends, in the series of EIA case studies, today we will discuss the fifth case study. You may recall first case study was related to the bullet train that is high speed train and the second was related to inland water transport and then we discussed hilly road and just before this particular lecture we discussed about this airport.

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The slide displays a table of contents for the EIA case study. The main title is 'Contents'. The list includes: EIA for Vizhinjam international deep-water multipurpose seaport (in state of Kerala, India), Project proponent & lender, Benefits of project, Phases of project & its timeline, Environment clearance, Alternative sites considered for project, Comparison of alternative sites, Major impacts & mitigation measures, Public participation, and Environment management plan. A small portrait of the professor is visible on the right side of the slide.

- EIA for Vizhinjam international deep-water multipurpose seaport (in state of Kerala, India)
 - Project proponent & lender
 - Benefits of project
 - Phases of project & its timeline
 - Environment clearance
 - Alternative sites considered for project
 - Comparison of alternative sites
 - Major impacts & mitigation measures
 - Public participation
 - Environment management plan

So, in this EIA case study, we will discuss about environmental impact assessment for Vizhinjam International deep sea water multipurpose seaport and this is in the state of Kerala in India. We will first discuss about project proponent and the lender for this multipurpose seaport.

And then the benefits of the project which has been envisaged by the committee responsible for this and then the phases of different phases, different stages of the project, because it is not that we can develop such a huge project in a single go, so, there are three stages basically, we will discuss in later on, and then the timeline of this particular stages, environment clearance related aspects and then the site location and then the alternative sites.

So, what were the reasons, so, that one particular site were chosen rather than other alternate sites, those comparisons will be made, and then the major impacts and mitigation measures as we do for air, water, flora, fauna, all those components of the environment and the public participation, we always discuss about that, that their feedback, their concerns, how those

concerns are addressed by the committee, which is responsible for this particular project, and then the overall environmental management plan that take care of all the issues.

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Comprehensive EIA for Vizhinjam international deep-water multipurpose seaport

- **Project:** Vizhinjam international deep-water multipurpose seaport
- **Location:** Vizhinjam, Kerala (India)
- **Project proponent:** Vizhinjam International Seaport Limited (VISL)
- **EIA report by:** L&T-RAMBOLL Consulting Engineers Limited


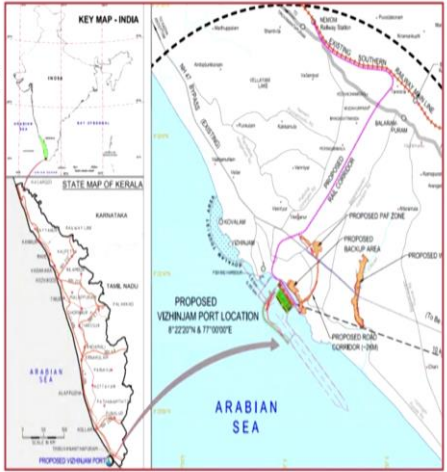


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Well, so, this is the comprehensive EIA, this report was there. So, we took information from this particular report, which was prepared by L&T RAMBOLL Consulting Engineers Limited and this project is as we have already known that this is Vizhinjam International deepwater multipurpose seaport and the location is this place is known as Vizhinjam in Kerala and the project proponent is basically again one independent organisation which is dedicated for this particular project. So, it is known as Vizhinjam International Seaport Limited that is VISL.

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Project location on map



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Project location

- The project site is located at Vizhinjam, Thiruvananthapuram District, Kerala





Image: Adimalathura (Sothern End) & Nellikkunnu (Northern end)

- The port facilities (including [quays](#), terminal area and port buildings) are proposed to be developed entirely on [reclaimed land](#)
- Adequate [backup area](#) and other land resources have been acquired in the vicinity of proposed port



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And the project location, you can see, this is the coastline of Kerala very long line. So, at this particular place, this is the location of the project and you can see this is one image of southern end of the project and this is northern end of the project and there are several facilities which will come up to carry out this project.


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Key words related to port projects

- Reclaimed land:** Land obtained though filling any marshy land or seabed
- Quays:** Platform on ports for loading-unloading of goods
- Backup area for ports:** Area within port premises for parking, offices, storage etc.
- Contours:** Lines representing same height or depth on map
- Greenfield project:** A new project starting from scratch

1 Nautical mile= 1.852 km

[Back to slide 5](#)



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So, that will be based on like reclamation of the land that means, that land will be obtained through filling any marshy land or sea bed. So, that will be the reclamation of the land. And then some backup area for other facilities of the project like parking, offices, storage, etc. And, this is a Greenfield project, because it is a new project and starting from scratch, there is no old project which will be modified or something like that. So, this is the green project in that sense.

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Vizhinjam International Seaport Limited (VISL)

- Vizhinjam International Seaport Ltd
- a company fully owned by Government of Kerala
- It is the implementing agency for the project, will be responsible for all obligations and responsibilities of the Government of Kerala
- Exclusive new organization for implementing project



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Well, so, this company, which has been established for this particular purpose, for establishment of this seaport, so, this is known as Vizhinjam International Seaport Limited and it is fully owned by state government of Kerala. So, this is kind of public company or public corporation established by the state government of Kerala. And it will be the implementing agency for this project. And as it is said that this is the exclusive new organisation which has been formed or created to carry out this particular project, then where this money will come from, huge amount is needed for such mammoth projects.

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International Finance Corporation (IFC)

- IFC is an international funding organization; part of world bank group
- Works towards the World Bank Group's twin goals of **ending extreme poverty** and **boosting shared prosperity**
- Advances economic development and improves the lives of people by **encouraging the growth of the private sector in developing countries**



swayam 8

So, the lending organisation is International Financial Corporation which is a unit of the World Bank. So, this organisation is the part of the World Bank and they have certain rules and regulations which will be followed as will be seen in next slides and their purpose like they give to those projects, they support those kinds of projects, which addresses the poverty alleviation or inclusive kind of growth, those kinds of economic activities, they support.

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Major site-specific advantages

- Availability of **18-22 m contour within one nautical mile** from the coast
- Proximity to International **shipping routes** approximately **10 nautical miles**
- Minimal drift along the coast
- Hardly any maintenance dredging is required
- Links to National/regional road, rail
- **Flexibility in design** and expansion being a greenfield project



swayam 9

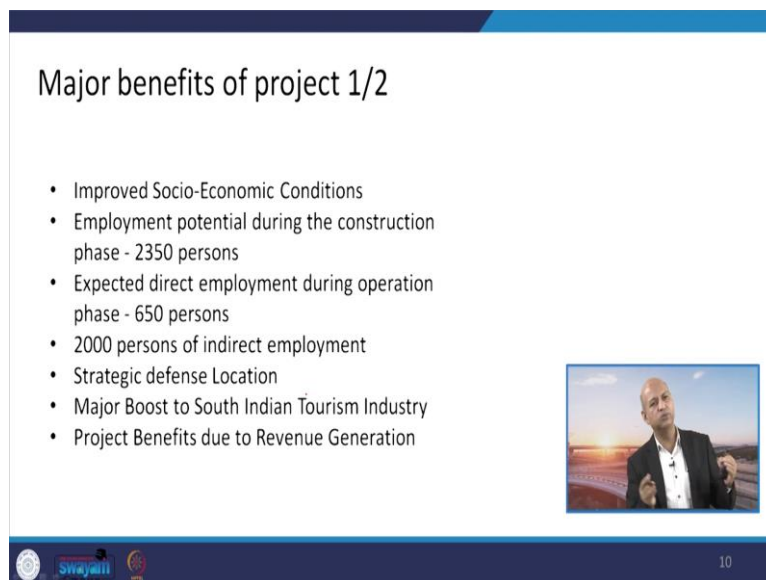
And these are the specific advantages for this major site, because it has kind of 18 to 22 metre contour within one nautical mile. So, that is one advantage, and then it is quite in the nearby area to the international shipping routes, approximately like 10 nautical miles. So, that is

quite close to those shipping routes, that way, it is quite easy to trading and having those transactions of everything, then minimal drift along the coast.

So, that site is particularly in that sense, very advantageous. And hardly any maintenance dredging is required that means the depth is available there. We will see later on that is around, 20 to 30 metre depth is easily available there naturally, there is no need of dredging and then it links to the national and regional routes or cities or markets through the roads, through the rails and this flexibility in the design in the sense that because it is a Greenfield.


So, we can design as per the requirement, lot of flexibility is there, there is nothing which restrict us to the development because sometimes when we develop the old port, then certain things are we cannot change. So, limitations are there, such limitation does not exist there accept the natural contours, natural, that location, whatever geographical location is there.

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Major benefits of project 1/2

- Improved Socio-Economic Conditions
- Employment potential during the construction phase - 2350 persons
- Expected direct employment during operation phase - 650 persons
- 2000 persons of indirect employment
- Strategic defense Location
- Major Boost to South Indian Tourism Industry
- Project Benefits due to Revenue Generation



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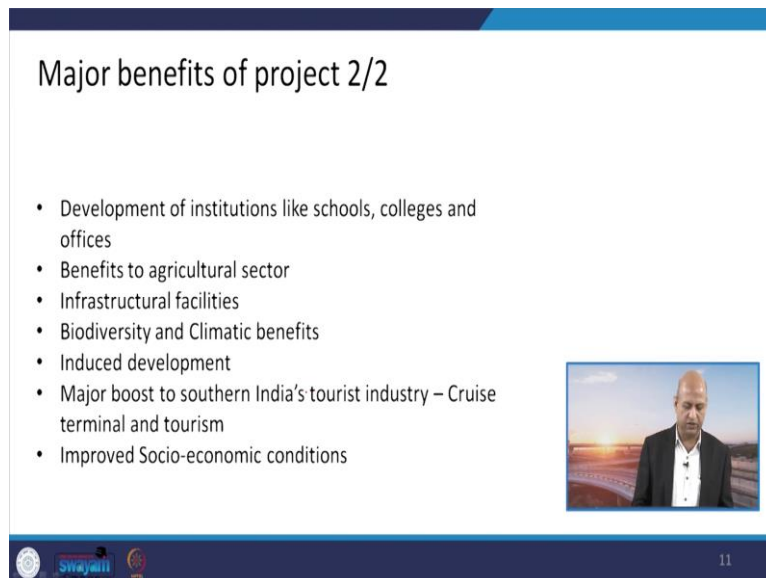
There are benefits of this project, which has been listed in this particular slide like improvement of the socio-economic conditions of that particular area and lot of employment generation during the construction of the project as well as during the operation of the project. So, during construction phase around 2,350 persons, they have been estimated, they will be employed.

So, it is not only the 2,350 persons, but the families and you go, you can do such calculations that how far reaching those benefits are there because families are benefited then the in relation other activities are boosted. Similarly, the expected direct employment is means those will work on the site and the project 650 and 2,000 are in direct employment, but

indirect employment they are immediate indirect employment in that sense, if you go for the chain reaction, there are many more thousands of indirect employment are generated in such big projects.


Then strategic defence location because, marine routes are there. So, for Navy also this is one very strategic location and major boost to South Indian tourism industry and the project benefits due to revenue generation. So, all these projects, these kind of big infrastructure projects, they bring revenue because of trades are boosted, they are increased and goods and services, efficiency increases, efficacy increases. So, the overall productivity increases in terms of socio-economic parameters.

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Major benefits of project 2/2

- Development of institutions like schools, colleges and offices
- Benefits to agricultural sector
- Infrastructural facilities
- Biodiversity and Climatic benefits
- Induced development
- Major boost to southern India's tourist industry – Cruise terminal and tourism
- Improved Socio-economic conditions

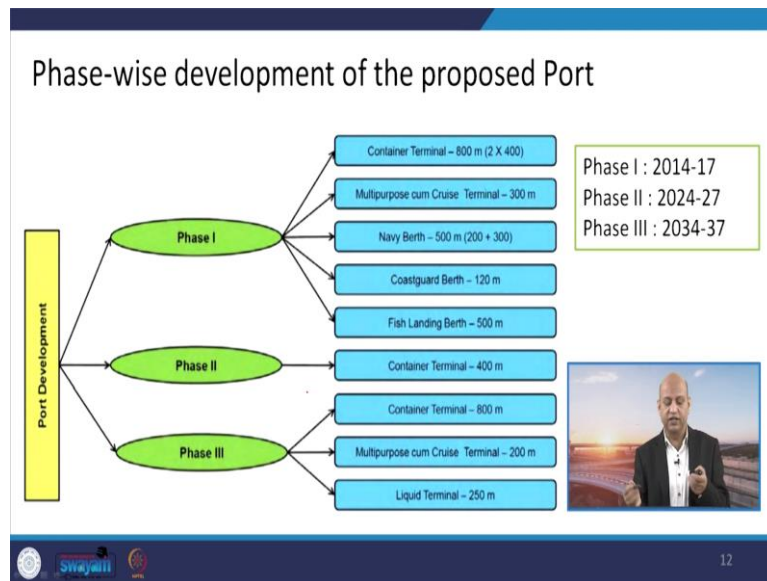


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Next is like development of several institutions like schools, colleges and offices. So, that will generate a lot of activities related to education and even health sector because hospitals will also come there, then agriculture sector or infrastructure facilities, biodiversity and climatic benefits, because of certain eco tools as these kinds of facilities also increases the opportunities for ecotourism.

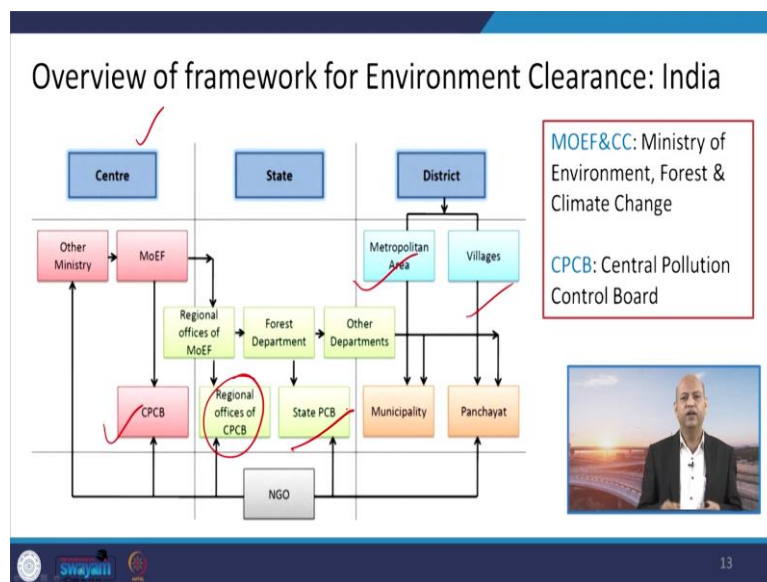
So, in that way biodiversity related benefits are there. And then this tourist industry of course, like cruise terminals and tourism, those things are very popular in those particular areas, beautiful state of Kerala as you know, already, hundreds and thousands of foreigners come there every year. So, this will further boost the tourism industry and that way the improvement of overall socio-economic conditions will be ensured.

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There are three phases for this project phase I, phase II, and phase III, like 2014 to '17 phase I, and 2024 to '27 is the phase II, and the next phase will be 2034 to 2037. So, these are different activities like container terminal will be created and multipurpose cruise terminal will be created. So, according to those phase related designs, those activities will be carried out.

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This is one framework and overview framework of environmental clearance. So, there is the contribution of centre organisations like MOEF, earlier it was known as MOEF Ministry of Environment and Forest. Now, we know it as a Ministry of Environment Forest and Climate Change, MOEF&CC. Central Pollution Control Board is there. So, role of all these agencies

of the central level, state and district level all these agencies are integrated in that way when environment clearance is related.

So, Metropolitan area, village panchayats, municipalities, all these will play in the role of getting the clearance and the forest department and the regional offices of the Central Pollution Control Board and then the State Pollution Control Board and certain, community groups, NGOs, they all play in such projects, important roles.

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Indian acts & regulations for environment protection

- Environment (Protection) Act 1986
- Air (Prevention and Control of Pollution) Act and Rules 1981
- Water (Prevention and Control of Pollution) Act and Rules 1974
- The Indian Forest Act 1927
- Biological diversity act 2002
- EIA notification 2006
- Coastal regulation zone notification 2011
- Noise pollution (control & regulation) rules 2000
- Solid waste management rule 2000
- National resettlement & rehabilitation policy 2007
- Public liability act 1991

These are the acts and regulations of the environment protection from time to time they are enacted by the government as already we know this is the backbone of all environment related rules and regulations, Environment Protection Act of 1986. And then the Air Prevention and Control of Pollution Act rules 1981, then 1974 is for Water Prevention Control Pollution Act.

And then the Indian Forest Act of 1927 all these kind of acts and Solid Waste Management Act of rule of 2000, Noise Pollution Control and prevention rule of 2000 and then 2011, Coastal Regulation Zone notification, EIA notification of 2006 and Biological Diversity Act, all these National resettlement and rehabilitation 2007, Public Liability Act of 1991, all these acts and regulations are taken care of whatever their provisions are there, which will be included in this project.


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Requirement from International Finance Corporation (IFC)

Performance Standards (PS) on Social and Environmental Sustainability by IFC are given as:

PS	Details
PS 1	Social and Environmental Assessment and Management System
PS 2	Labor and Working Conditions
PS 3	Pollution Prevention and Abatement
PS 4	Community Health, Safety and Security
PS 5	Land Acquisition and Involuntary Resettlement
PS 6	Biodiversity Conservation and Sustainable Natural Resource Management
PS 7	Indigenous People
PS 8	Cultural Heritage

Being part of World bank, EIA requirements of IFC are same as World Bank



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So, the requirement from the lending agency or funding agency, there are certain requirements, these are the performance standards basically known as social and environmental sustainability by IFC, which is part of World Bank. So, we have to ensure that these kinds of guidelines are properly met, community health related, labor and working conditions, social and environmental assessment and management system.

Land acquisition and involuntary resettlement these things should be as per law of the land, but they should be ensured properly, there should not be any kind of violation of the rules and regulations. Then biodiversity, conservation, sustainable natural resources management, otherwise, certain activity can harm a particular species. So, those kinds of sensitive or endangered species, there care should be taken.



Then indigenous people's requirements because since thousands of years, certain communities are living in a particular location, if you disturb them, because of certain projects, that is also not good. So, we have to take them into confidence, that okay, you can carry out your traditional activities at a particular location. So, with their, these kind of consultation and discussions, then those things are decided.

Cultural heritage maybe there, so, suppose some temple site is there or some religious place or some eco sensitive areas are there in like, in northern, we have these Ganga, Yamuna those kinds of rivers and they may be in entire country, we have such heritage which are cultural in the sense or religious sentiments are linked with those. So, those things also we should take care of.

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Influenced area/General study area

- Area within 10 km radius with the Vizhinjam port site as a center has been earmarked for the study as the general study area
- 30 km stretch (15 km both sides) of the shoreline was studied for social impacts and shoreline impacts
- Core study area is the acquired project area with a two-kilometre radius from the center of the port site



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Then these influenced area, general study area, which are like 10-kilometre radius. So, with this like port site as a centre and we if this is the side then within the 10-kilometre radius we have to study this, any effect or any impact. And the 30 kilometre stretch that is 15 kilometre on this side 15 kilometre on that side of this shoreline and that is to be for social impacts or shoreline related impacts.

Then core study area, which is actually the project area within the 2 kilometres radius that is the core, all other areas were associated areas, but these are the core which is the port site. So, how these different areas are developed. So, all these things encompass in this particular environmental impact assessment.

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Phase-I project cost

Description	Phase I (in ₹ Crores)
Port Facilities (VISL + Private Operator)	3640 (2332 + 1308)
Road	60
Rail	350
Power	50
Water	10
CSR & EMP Costs [5% of 2332 crores (VISL portion of phase I port costs) plus 5% of 470 crores external infrastructure cost]	140
Land Cost (140.42 Ha)	937
Total	5,187




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Then if we see the project cost related like, this is around 3,640 crores for this particular port facilities and for roads and that way, the total cost is around 5,187 crores that in Indian rupees.

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Alternatives for site for project



Site	Location
A	<u>Vizhinjam</u>
B	<u>Pulluvila</u>
C	<u>Poovar</u>



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Well, there were three sites total, in total which were considered for this particular project. So, site A is the one which we are discussing and why it was selected, we will see now. And the second one was Pulluvila and this the third one was Poovar. So, these sites were considered and their plus, minus, their strengths, weaknesses, those opportunities, limitations, those things were discussed properly listed and survey were conducted, and then the decision was made. So, you can see these are the locations of site A, site B and site C at the coastline.

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Criteria for site selection

Following criteria/considerations have led to the selection:

- Port Development
- Operational & Navigational
- Connectivity with other modes of transportation
- Environmental Aspects ✓
- Social Aspects ✓
- Cost ✓




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What were the criteria for selection? Criteria like how port development activities will influence those particular sites and whether they will help or they will, give some sort of hindrance. Operational and navigational activities will be comfortably organised or there will be some challenges.

Connectivity with other modes of the transportation like railways, highways, whether it is easy to connect with them from these locations or they are quite far away and then we have to do lot of additional work for that. Environmental aspects in which particular site, minimum environmental degradation happens or minimum damage happens to any kind of environmental component. Social aspects, which is most beneficial, where, least cost is there. So, all these aspects are there for making the decision.

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Comparison of alternative sites for port development		
Site A ✓	Site B	Site C
<ul style="list-style-type: none"> About 3.5 km is a rocky coast with practically no continuous sandy beaches Behind the coast, the steep rocky slopes rise towards a hillock area of 60-70 m height Natural depth of 20 - 23 m is available at approximately 2.0 km from the coastline Protection is available naturally by the presence of fishing harbor north of the site 	<ul style="list-style-type: none"> Approximately 2.0 km length with 400 to 500 m wide flat foreland in front of a steep laterite face up to a 50-60 m high hillock area Area is frequently flooded during rains and is not inhabited, but filled with coconut trees Natural depth of 16 - 20 m is available at approximately 2.0 km from the coastline 	<ul style="list-style-type: none"> Large low-lying area with marshy parts, prone to flooding from the river, backwaters and small hillocks Natural depth of 20 m is available only at 2 - 3 km from the coastline. Sandy foreshore is only approximately 50 m, and a rubble mound seawall is protecting Pozhiyoor village




So, when we compare like, these alternative sites, so, there are several parameters in this comparison site A, site B, site C. So, for example, this is the rocky coastline in site A where this was chosen and this was not available in these two particular sites. This was the marshy part in site C lot of so that marshy land if you reclaim then, it is a huge challenge in fact. Then these steep rocky slopes were there and natural depth around 20 to 23 metre is available at the approximately 2 kilometre, and in this around 16 to 20 metres, so, it is shallow in comparison to this one. Similarly, here you can see 20 metre around so, means benefit is at the site A.

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Comparison of alternative sites for connectivity

Site A	Site B	Site C
<ul style="list-style-type: none">• Presence of cliff behind the coastline poses difficulty for surface linkage access to the site• Alternative could be to make an access from around the base of rocky promontory to Adimulathurai village and from there to District road	<ul style="list-style-type: none">• Village road connecting the District Road at Adimulathurai can access the proposed site• Widening of this road may be needed to cater to road traffic	<ul style="list-style-type: none">• Access to the project is from the Poovar village through a single lane road• This site is connected to NH 47 through a two-lane road till Neyyatinkara village

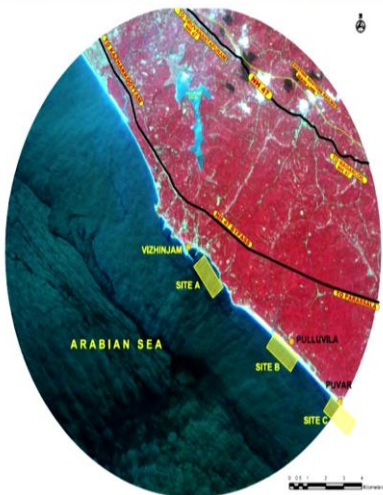


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Similarly other alternatives like access around those particular site is easier, village roads are there, then access to the project is from particular village. So, a lot of disturbances may occur there, but it is not that every kind of benefit was associated with site A, some benefits were with site B and site C, but in totality, the totality benefits were assigned, means total points were in favour of site A.

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Comparative access to highway for site alternatives



Satellite Imagery showing location of alternative sites with nearby national highway (NH-47)




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You see the competitive access to highway for the site alternatives. So, these are the locations. So, this is NH47 Highway and from this location you can see which is nearer or which those countryside lines, roads are available to connect this particular highway.

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Comparison of alternative sites for operation & navigation

Site A	Site B	Site C
<ul style="list-style-type: none">• 200 Ha will be established by reclamation• Approximately 2.0 km from the coastline having a natural depth of 20-23 m.• Outer breakwater will be located at water depths of around 18 to 23 m• Breakwater is planned parallel to the coast based on the studies and it was found to be efficient.	<ul style="list-style-type: none">• 150 Ha in the full development by reclamation.• Approximately 2.0 km from the coastline a natural depth of 16-20 m• Outer breakwater will be located at around 20 m water depth.• Breakwater layout is considered to be perpendicular to the coast to reduce siltation along the approach channel.	<ul style="list-style-type: none">• 150 Ha in the full development by reclamation.• Approximately 2 - 3 km from the coastline is having a natural depth of around 20 m.• Outer breakwater will be located at 20 m water depth.• Breakwater layout is considered to be perpendicular to the coast




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And then some how much land is to be established by reclamation, it is higher than in comparison to them as I said certain advantages maybe to other sites, but in totality is it is better. And then outer this breakwater will be located at water depth of around 18 to 23 metre. So, this is the difference between other sites which are not so, beneficial.

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Comparison of alternative sites for environment

Site A	Site B	Site C
<ul style="list-style-type: none">• Shoreline in this stretch is rocky characterized with thick laterite capping with exposures of gneissic rocks at the foothills• The beachfront in this stretch is nonexistent or very narrow at few locations• Environmentally sensitive coastal vegetation like mangroves is not observed along this stretch	<ul style="list-style-type: none">• Coastal vegetation like mangroves is not observed in this stretch	<ul style="list-style-type: none">• Backup area (swampy area) earmarked for the port is devoid of mangroves• The vegetation observed in the site is mostly represented by local floral varieties like coconut trees




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Well, environmentally sensitive coastal vegetation like mangroves is not observed along this stretch which is very good, very important aspect because these are the very sensitive ecozones, we should be careful about. So, those kinds of advantages are associated with site A, whereas this backup area is swampy and the vegetation is observed in the site is mostly represented by local floral, this varieties like coconut trees etc. so, those issues are there.

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Comparison of alternative sites for social aspect (Livelihood & tourism)

Site A	Site B	Site C
<ul style="list-style-type: none">Coastal stretch at this site shadow zone does not come under active fishing. Fishing activity in this area is confined to deep seas.On the hill slopes overlooking the sea, several tourist resorts are locatedMost likely attract a considerable number of cruise ships per year bringing thousands of tourists to the area	<ul style="list-style-type: none">Fishing activity is highly intensive in this stretch.	<ul style="list-style-type: none">There is no fishing activity in this beachfront.Impact on the tourism front due to the development and operation of the port at this site (disturbing natural beauty of back waters)



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Similarly, like social aspects of livelihood tourism related issues. So, already I know some like fishing activities are there, this activity is not much in and around the site A. So, this will not be disturbed otherwise this will be disturbed they will be relocated elsewhere. Then impact on the tourism front due to the development and operation of the port at this site disturbing natural beauty of backwaters. So, this is already site C, good tourism businesses there. So, rather than reducing that business, we should have some other sites. So, that way that particular site A was better than other two sites.

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Comparison of alternative sites for cost

- Site A has the advantage of using cutting material along the land side for filling. Also, the breakwaters planned at Site A is flexible for phase wise construction
- Diversion of river may be taking place at Site B and Site C which will increase cost
- Maintenance dredging for Site A very minimal compared to Site B & C.
- All other facilities and infrastructure elements are assumed to be equal for the three sites

Based on comparative analysis of sites, site A was finalized for the project.



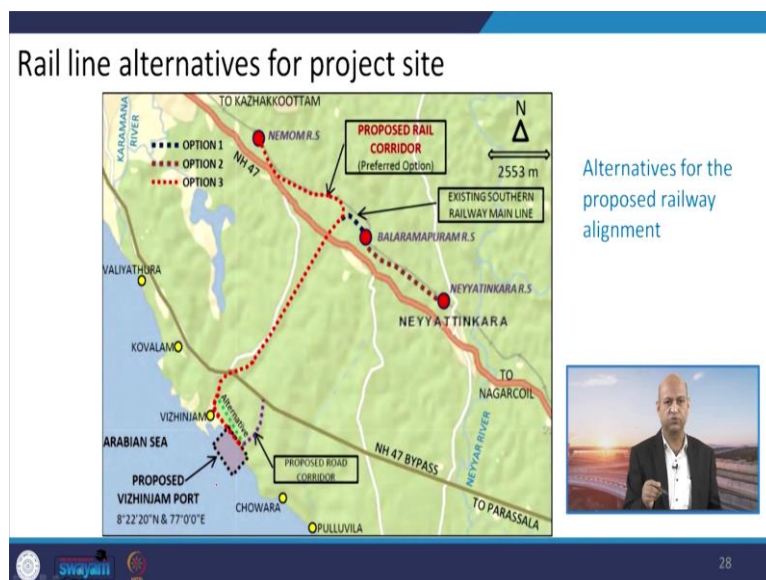
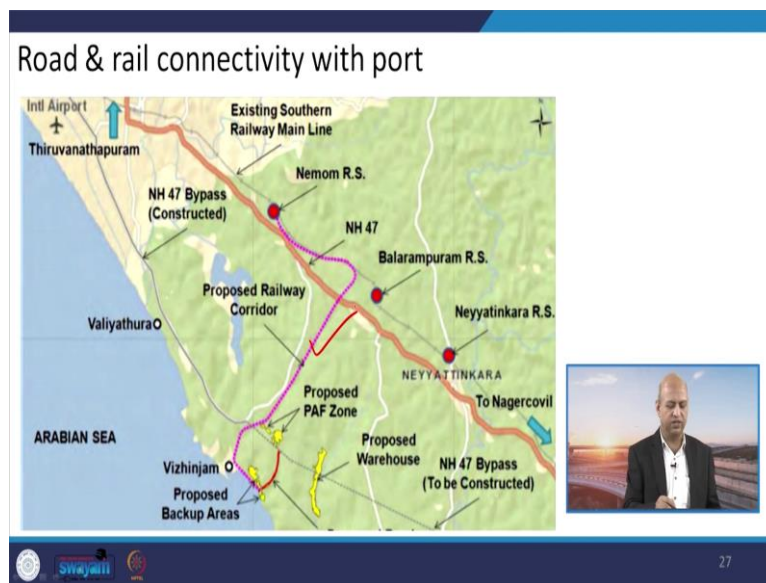
26

So, the site A has many advantages like cutting material is available, because we have to reclaim the land as you know, so, this cutting material can be used for reclamation at the

seashore. So, the comparative analysis, whether diversion of the river at the site B and site C such things are not there at the site A.

Maintenance dredging for site A very, very minimal compared to site B and C which is also big challenge when some particular locations, lot of silt occurs for dredging related requirements are there, then it is very costly affair and it is also not good for the environment because it disrupts turbidity, due to turbidity and other issues happens. So, those challenges are not there at site A. So, ultimately the site A was selected.

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The road and rail connectivity you can see, it is quite easy to connect. So, the proposed this rail route is there otherwise existing rail route is also there, NH47 is quite nearby already, this


is the proposed rail corridor for this particular project. So, that way, the connection with other existing rail routes and highways is very convenient.

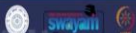
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Alternatives for end-point terminal at Vizhinjam

Option 1	Option 2	Option 3
		

Due to the limited options available for the rail and road access to the proposed port and significant cost involved in land acquisition, R&R, and technical issues for Option 1 and Option 2, Option 3 was considered and taken forward for the final master plan





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Then, you can see this option 1 and option 2 and option 3, alternatives for end point terminals. So, these are like, if we have this option 1, then rail comes from this side, option 2 from this side and option 3 from this particular seashore. So, depending upon the location and the local requirements, local limitations, these options were considered.

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Alternatives for end-point terminal at Vizhinjam

Planning Flexibility	Moderate: Flexibility in rail yard planning	High: highest level of flexibility in planning as the proposed road & rail connectivity would be expandable with port	Low: layout offers the lowest flexibility in planning due to the rail yard entry constraints because of "S" curve of the rail line
Social Impact	High: Social cost would be high due to the displacement, R&R of local community	Medium: Social cost would be overcoming the resistance of the local community due to the rail corridor physically dividing the land adjacent to the rail.	Low: Social cost would be minimal as the proposed rail corridor will be through the existing drainage so displacement of local community would be minimal
Technical Feasibility	Difficult: due to the unfavorable topography	Very Difficult: rail connectivity will need tunneling & land cut to overcome steep grading and highly unfavorable topography	Moderate: Technical difficulty to be overcome for the last mile connectivity (sharp "S" curve) which will be an elevated structure & yard entry has to be through the northern breakwater
Impact on Port Costing	High economic cost involved in Land Acquisition, R&R for the rail corridor	High economic cost involved due to the tunneling requirement for rail corridor	Moderate economic cost involved in providing an elevated structure for the last mile rail connectivity




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And then the planning, flexibility or social impacts and the technical feasibility, all these issues were discussed thoroughly. And then the decision was made that which particular

options should be considered for connecting the port to the railways. So, those proposed railway network has also been properly decided.

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The slide is titled "Primary stakeholders for participation". It features a list of stakeholder groups on the left and a box of activities on the right. The stakeholder list includes: Project Displaced Persons (PDP), Project Affected Families (PAF), Project Affected Persons (PAP), Squatters Encroachers, Project impacted communities, and PAFs in the road-rail connectivity alignment. The last two items have red checkmarks next to them. The activities box lists: Focus group discussion, Informal discussion, Interview, and Formal community discussions. A small video inset shows a man speaking. The slide footer contains logos for Swayam and the number 31.

Primary stakeholders for participation

- Project Displaced Persons (PDP)
- Project Affected Families (PAF)
- Project Affected Persons (PAP)
- Squatters Encroachers
- Project impacted communities ✓
- PAFs in the road-rail connectivity alignment ✓

Activities during public consultation

- Focus group discussion
- Informal discussion
- Interview
- Formal community discussions

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Well, the primary stakeholders for participation are like project displaced persons, if when this kind of big facilities coming and some already some people are living in the surrounding area, they have to be vacated. So, their compensation, their livelihood, all those issues have to be addressed. Then project affected families, some families will be affected in those areas, project affected persons or squatters encroachers, some people have this habits, some encroachment happens because of certain reasons. So, they have to be removed. Project impacted communities, certain communities, which will be directly or indirectly influenced or affected by this project.

(Refer Slide Time: 23:19)

Public participation: photo gallery



Exhibit 1: CEO of VISL discussing with District Collector

Exhibit 2: The Banner displayed on Public Hearing

Exhibit 3: A close-up of the crowd

Exhibit 4: Video and Still Camera

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So, all those issues have to be taken care of and road, rail connectivity alignments. So, all these things are to be taken through public consultation, public participation. So, these are the, photo galleries of those public participation related events were organised by these district authorities and other EIA related those agencies.

(Refer Slide Time: 23:37)

Media coverage of public participation



EIA hearing sees waves of support, criticism

Suggestions galore at public hearing for port project

Tourism body backs project

TURBULENT SCENES DURING HEARING SESSION

Shoreline change fears misplaced, say experts

Local thumbs up for Vizhinjam


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Well, so, even through media also a lot of publicity was there and all kinds of viewpoints were, invited and some people criticised some were in support. So, ultimately, it was convinced, the public was convinced the benefits are much more than whatever, law says we are envisaging, so, that way this project is very much beneficial for the local communities and local people and also increasing connectivity with other regional organisations.

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Aspects of impact considered for project

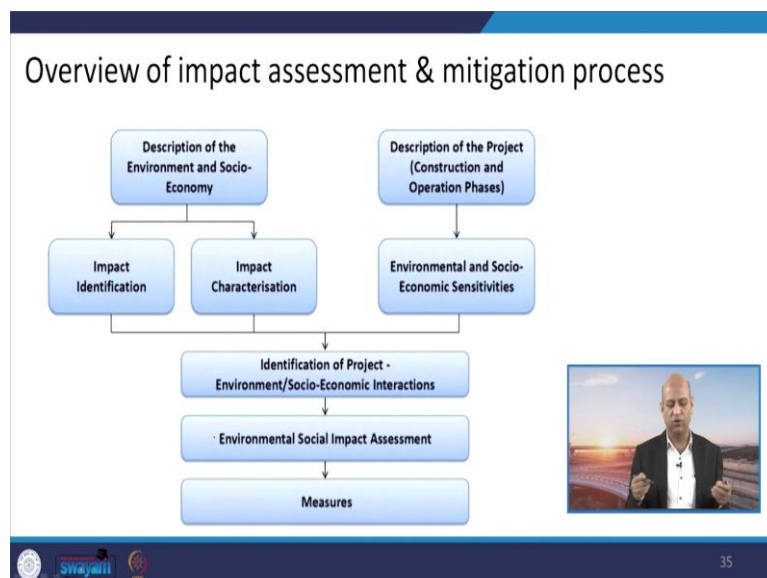
- Land environment
- Air environment
- Water environment
- Noise pollution
- Marine environment
- Biological environment
- Waste management



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Well aspects of impacts considered for the project, which always happen in EIA like land, water and here marine environment is also very important like hilly areas, those landslides related issues happen, more important here those issues are not there, but marine environment, again, some eco sensitive zones or aquatic life of the sea, all those things have to be considered. Waste management, biological environment, noise, pollution, air environment, all these things are to be considered in this EIA study.

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Well, so these are the impact assessment and mitigation processes. This flowchart shows all these like impact identification, characterization of those impacts and then social impacts listing and then the mitigation measures which are to be suggested to address the impacts.

(Refer Slide Time: 25:08)

Mitigation measures for change in land use

- The planning will be in accordance with landscape planning concepts to minimize major landscape changes.
- Land reclamation and change in land use pattern will be limited to the proposed port limits
- Project will be carried out in such a way that to ensure the proper drainage by providing surface drainage systems including storm water network, etc.




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So, these are the mitigation measures like in accordance to the landscape planning concepts, minimising major landscape changes. So, that minimal changes happen and natural contours are to be followed as much as it is possible. Land reclamation and changes in the land use pattern will be limited to the proposed port limits only not outside. Project will be carried out in such a way that to ensure the proper drainage by providing surface drainage systems including the storm water network, so, that there is no flooding or those issues.

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Mitigation measures for land reclamation impact

- Reclamation bunds and setting ponds shall be constructed
- Dredged material will be pumped into the reclamation area enclosed by reclamation bunds wherein the solids will be allowed to settle and the return water will be directed into sea through appropriate return channel/pipelines.
- The dredge fill will be covered by gravel before hard standing in order to prevent the seepage of return sea water into the groundwater,
- Suitable impervious liners such as LDPE will be provided all along the return water channel if required



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And reclamation bunds to be prepared, settling ponds are to be constructed, wherever dredging is required those facilities are to be installed and then the solid waste management or sludge management kind of thing, and suitable interventions like liners with impervious

lines of these low-density polyethylene kinds of materials, all these things are required for those facilities.

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Mitigation measures for impacts on **shoreline**

- Continuous monitoring of shoreline with the help of high-resolution satellite imageries during construction and operation phase.
- Fixing of shoreline just prior to construction phase by latest satellite imagery and then **ground truthing on a regular basis with close monitoring and ground markings.**

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And then when we talk about shoreline, so, again there are several issues. So, continuous monitoring is required so that the shoreline does not get affected negatively and if there is any, problem then it should be fixed timely.

(Refer Slide Time: 26:28)

Mitigation measures for impacts on **surface water**

- Two **polluting streams joining sea** at new proposed fishing harbor site will be **treated.**
- Effective **water conservation measure** should be followed.
- **Rain water harvesting/ storm water management** in the projection region.
- **Providing water & wastewater treatment facilities** at construction camp.
- **Regular monitoring of surface water** for quality and quantity


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Then we see like pollution streams, whether water related or wastewater related. So, wastewater treatment should be there and then the surface water, how to collect or how to drain them out, so that there is no accumulation of water at certain points.

(Refer Slide Time: 26:45)

Mitigation measures for impacts on water sources

- **Baseline review** of the existing groundwater resources and current consumption in the project region.
- A **groundwater monitoring program** should be implemented during the construction phase.
- When (deeper) aquifers are exploited the **phreatic aquifer should not be affected**.

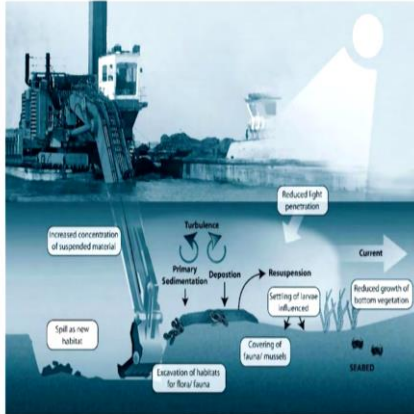


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So, these mitigation measures are for water sources and then the groundwater monitoring is to be done. So that, if there is oil spillage or something happens, it should not go and pollute those groundwater or other resources, and the aquifers and other water resources are to be properly protected.

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Impact due to capital dredging



- Increased concentration of suspended material
- Excavation of habitats for flora/fauna
- Reduced growth of bottom vegetation



Source: Axel and Christine, Terra et Aqua, No. 114, March 2009

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Impacts due to dredged material disposal

- Increased turbidity in water
- Adverse impact on plankton fish

Source: Axel and Christine, Terra et Aqua, No. 114, March 2009

Well, the dredging issues can be there. So, it has to be properly managed, so that the suspended material which can increase the turbidity etcetera, which should be removed timely and properly. So, these pictures show how these will be ensured.

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Mitigation measures for impacts of dredging

- Appropriate selection of equipment for pile driving and dredging
- Providing silt screen to avoid movement suspended solid for a longer distance
- Uniform disposal of dredged material at identified disposal location


And then again for dredging, so, appropriate selection of the equipment for dredging, so, that minimum cost is there and maximum output is there.


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Impact on green cover & mitigation measures

S. No.	Road Alignment			Rail Alignment			Growth of the Trees along Proposed Road/Rail Corridors
	Impacted Trees	Total Nos.	Area in Hectares	Impacted Trees	Total Nos.	Area in Hectares	
1	Coconut trees	100	3.44	Coconut trees	6898	27.59	Fully grown and yielding
2	Plantain (Indigenous banana)	7140	2.55	Plantain (Indigenous banana)	13356	4.77	Seasonal Two times a year
3	Tapioca crop	1140	0.57	Tapioca crop	4600	2.30	Seasonal two times a year
4	Paddy	-	1.05	Paddy	-	9.63	Two times a year
5	Other trees Mango, Jack fruit, Tamarind,	100	0.50	Other trees Mango, Jack fruit, Tamarind,	1000	3.00	Perennial crop
	Total		8.11	Total	47.29		

As a part of total loss of green cover VISL is committed to plan about 25-hectare vegetation cover along the acquired land




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These are the impact on like green cover mitigation measures. So, there will be certain number of trees which will be cut because we will need roads and railways, railway alignments. So, to compensate those these are trees in number quiet, spread over a large area, but, the 25-hectare vegetation cover has been guaranteed by the project proponent that dense forest will be developed by them to compensate these losses of the trees and plants.

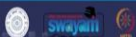
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Sources of air pollution during construction

- Material sourcing at Quarry Material transport
- Equipment transport
- Stone crushing operations in the crushers
- Handling and storage of construction material
- Construction and allied activities.

No major air pollution source during operation phase of project.





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Sources for air pollution can be there because, like quarry material and then the dust suspension or stone crushing operations, all those construction material will be required. So, those activities will be there during the construction phase.

(Refer Slide Time: 28:37)

Mitigation measures for air pollution

- Material transportation through sea will reduce dust & emissions
- DG sets should be used only during power cuts
- Low Sulphur content diesel shall be used as fuel for generator sets
- Vehicles older than 15 years will not be allowed to operate during construction phase
- Storage facilities shall be equipped with leak detection systems.
- Vegetation screens alongside the port access roads




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So, we have discussed in several other projects also how air pollution mitigation is ensured, like sprinkling of water and then monitoring and similarly, like DG sets, so, those issues like noise related issues or air pollution related issues have to be properly ensured that there is no violation of the guidelines.

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Mitigation measures for noise pollution

- Acoustic fencing might be installed along the edge of the access road
- Vehicles and generator sets to be serviced regularly and maintained properly to avoid any unwanted generation of noise or vibration
- Employees working in noisy environment should be made to wear earmuffs/ear plugs to avoid any adverse impact of noise




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So, those, acoustic fencing might be installed along the edge of the access road, those noise barriers, you can see, then vehicles and generator sets be serviced regularly. So, maintenance and operations should be proper, so that there is no problem with the noise or emissions.

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Mitigation measures for solid waste

- Solid waste shall be adequately collected and managed
- Appropriate facilities shall be provided for the reception of all wastes arising from ships.
- These should include facilities for the following basic categories of ship-generated wastes:
 - Oily waste (usually oil mixed with larger quantities of seawater, also fuel residues and sludge)
 - Garbage (originating from crew and passengers, maintenance of the ship, cargo and fishing activities)




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So, similarly solid waste related issues are there, because lot of solid waste is generated during construction activities. So, that should be properly handled and properly disposed of otherwise, it can really affect the environment in very negative way like oily waste, maybe there, garbage and then the crew, passengers, cargo when in the operation phase, all these issues will be there. So, handling those kind of solid waste needs peculiar expertise. So, those kinds of people should be hired, those kinds of facilities must be created so that this particular oily sludge can be properly treated otherwise, it can really damage lot of soil and other areas.

(Refer Slide Time: 29:59)

Mitigation measure for impacts on livelihood

- Additional fish landing space to ease the congestion at the existing fishing harbor
- Improve the living conditions of economically displaced
- Culturally sensitive and economically sustainable income restoration measures
- Identify and provide special assistance to people who are especially vulnerable to economic displacement impacts



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Then mitigation measures for impacts of the livelihood. So, additional fishing areas will be provided to the people and their living conditions will be improved because the local

population will also get employed there. So, those kinds of things will be ensured that the socio-economic advantages are there for the local population.

(Refer Slide Time: 30:19)

Monitoring programme for project


Attribute	No. of location
Air Quality	5
Noise level	5
Ground water	3
Surface water	3
Soil	4
Marine water	5
Plankton & Benthic	5
Sediments	5
Shoreline	15 km north & south (satellite)



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Well, for monitoring, there will be a number of sites like air quality, 5 locations will be there for noise level, groundwater, different number of sites are there, so, along the shoreline 15 kilometre north and south, then these monitoring stations will be run and the data will be analysed time to time so, that it can be caught or it can be known, if there is any accidents from the those guideline related levels.

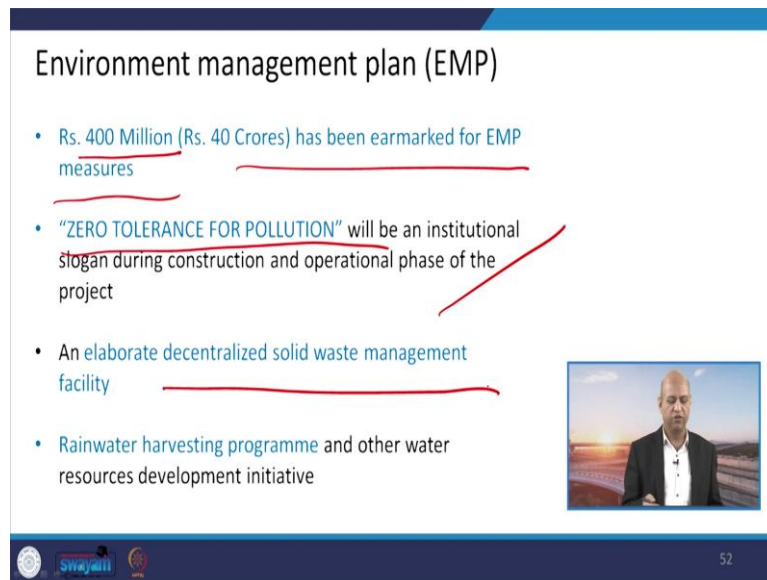
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- ### Environment management plan (EMP): main attributes
- Water conservation measures
 - Storm Water Management
 - Effluent treatment & Disposal
 - Spill Containment and Management
 - Greenbelt/green areas Development
 - Environmental monitoring program
 - Institutional mechanism
- 
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Well environment management plan will consider all these water conservation measures or storm water management, effluent treatment, disposal which we already have discussed, then

spill containment, oily spillage etcetera and then their management or like greenbelt and green areas development for reducing noise, air pollution and also adding to the scenic beauty. Environmental monitoring plan and institutional mechanism for ensuring those monitoring properly.

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The slide is titled "Environment management plan (EMP)". It contains four bullet points:

- Rs. 400 Million (Rs. 40 Crores) has been earmarked for EMP measures
- "ZERO TOLERANCE FOR POLLUTION" will be an institutional slogan during construction and operational phase of the project
- An elaborate decentralized solid waste management facility
- Rainwater harvesting programme and other water resources development initiative

A small video inset on the right side of the slide shows a man in a dark suit and white shirt speaking. The slide also features logos for Swajati and other organizations at the bottom left, and the number 52 at the bottom right.


So, environment management plan, this has been earmarked for EMP around Rs. 400 million that is Rs. 40 crore rupees totally dedicated to this particular activity, so, that it can be ensured properly because a lot of equipments are needed for monitoring, then expert people or skilled people are hired, all these need money, for institutional development for these kinds of activities, they all need money.

And then the zero tolerance for pollution, this is the philosophy for this particular project which has been adopted. So, this is one thing which we should praise that the pollution will not be tolerated, no pollution of air or water or any other kind of pollution. Then the decentralised solid waste management will be promoted, so that more people are involved and the rainwater harvesting that is buzzword nowadays and people really mean also there are facilities which are used for rainwater harvesting.

(Refer Slide Time: 32:32)

Conclusion

- Proposed port will attract commercial cargo traffic from international sea routes passing from near by as well as support coast guard and navy.
- Detailed study has been done to assess the various possible impacts of project on local environment including sea and marine life in nearby area.
- Mitigation measures are adopted and environment management plan and monitoring plan are in place to implement and evaluate these measures .



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So, in conclusion, we can say that this project which is proposed, it can attract a lot of commercial activities related to cargo traffic and even tourism because it is nearer to the international sea routes and it is also will support the coast guard and navy. So, strategic location is also there.

Then, this detailed study has been already done for the local environment and the local socio-economic aspects. And we have seen that everything are into place and confidence has been developed through public consultation and the mitigation measures have been through properly listed and the 400 million Rupees have been dedicated for environment management plan. So, we can assume that everything will go in the right way.

(Refer Slide Time: 33:41)

References:

- Vizhinjam International Seaport Limited, Government of Kerala; 2013 "Comprehensive EIA for Vizhinjam international deep-water multipurpose seaport"



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So, that is the impact or result of such detailed EIA. So, that way you know now, the five case studies we have done for the EIA, this is the reference for this particular EIA, otherwise every case study is based on certain EIA study. So, that way as I said initially also now, you have complete picture of EIA studies for different kinds of projects, and that way I am sure that you can now carry out environmental impact assessment study for any kind of transportation system or transportation related project.

Thank you for your kind attention. So, that way we have considered five case studies, I am sure you have enjoyed this. And this have enlarged your viewpoint or like worldview about the environmental impact assessment aspects of different transportation projects. Thank you again. Thank you.