

FINAL REPORT



Resettlement of Project Displaced Families and Persons of Integrated Urban Regeneration and Water Transport System Project (IURWTS)

Implementing Agency



antea group

ANTEA NETHERLAND. ANTEA INDIA.

By

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Requisition Agency

KOCHI METRO RAIL LTD.

By

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Abbreviations

IURWTS	Integrated Urban Regeneration and Water Transport System Project.
APL	Above Poverty Line
BPL	Below Poverty Line
LA	Land Acquisition
NGO	Non - Governmental Organisation
NTH	Non - Title Holder
MSW	Master of Social Work
PAP	Project Affected Person
PAF	Project Affected Family
TH	Title Holder
SIA	Social Impact Assessment
SIMP	Social Impact Management Plan
RTFCTLARR Act	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act

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EXECUTIVE SUMMARY

1.1. Introduction: Project and its Public Purpose.

Water ways and Canals were the first organized irrigation and transport system established in the human history. In the 7th century BCE the Assyrian king Sennacherib built a 50-mile (80-km) stone-lined canal 66 feet (20 metres) wide to bring fresh water from Bavian to Nineveh. The Phoenicians, Assyrians, Sumerians, and Egyptians all constructed elaborate canal systems. The most spectacular canal of this period was probably Nahrawān, 400 feet wide and 200 miles long, built to provide a year-round navigation channel from near Sāmarrā? to Al-Kūt. Major cities across the world, whether it is Venice, Amsterdam, or London, are known for their well-maintained waterways and canals. They regenerated their waterways, and they are now their life lines. In Kochi, only 20% of waterways are in use for navigation, while the remaining are used as drainage canals.

Mr Logan, Historian and a Traveller who visited Kochi in 1887 wrote that “Cochin possessed great natural facilities for trade as it was the center of an immense area of rich country, tapped in all directions by inland backwaters and navigable creeks. He has recorded that the Cochin River, rather the tidal opening of an immense system of backwaters in which numerous large rivers from the Ghat Mountains lose themselves, stretched north and south into Travancore and Cochin kingdoms and afforded an admirable means of conveying the produce of that immense tract to the markets of Cochin”.

Regarding Kochi city, the main canals are navigable for small and medium crafts. The secondary canals used to serve as natural drainage canals in the city for flood waters, but today they are in an advanced stage of deterioration through silting and waste dumping and fail to serve their purpose. The effects of inadequate drainage become visible and real with flooding and water logging of low lying areas during rainy season. The terrain features have adverse influence on the sewerage and drainage system of the area. Percolation of effluent from septic tank and dispersion trenches pollute the ground water. Commercial wastes are mostly directed to open surface drains. To ensure ruling gradient the drains have to be deepened often below the sea level and the sewage has to be regularly pumped to its outfall regions for disposal. The outfall regions are again the back waters. The back waters further take the load 48 of effluents from the industry, most of which are located in the water fronts and river side. The continued effects of all these factors result in the abuse of water courses, environmental deterioration and public health hazards.

Heavy showers during the monsoons over the whole of the state, sustains a system of rivers and estuaries originating from the Western Ghats. These rivers transport the sediments from high lands and mid lands to the plains and discharge them into Arabian Sea. The interaction between the river discharge and the tidal forces has helped the sediment deposition, there by directly influencing the creation of lagoon system and land forms of the area.

The characteristic physical feature of Kochi is the expanse of backwaters and low lying wet lands. The backwaters of Kochi form part of the Vembanad water basin of the Central Kerala. This, together with a number of canals provides the cheapest means of transportation, especially for bulk goods to and from the city. However due to misuse these canals are not adequately used as waterways for transport. These water bodies are often made to contribute to environmental degradation due to waste dumping and other misuses.

Kochi's lifeline is its waterways. However, the fact is that only 20% of the waterways in the city are being utilized for navigation and transport. The rest 80% have been, across time, reduced to drains. Government of Kerala with its Canal Rejuvenation Project aims to restore and rejuvenate the canals in the city that were once used for navigation and create an extensive and efficient waterway network for Kochi Cites. This will also help to solve the growing concerns over waterlogging during rains, the primary reason for which is poorly maintained canals that serve as rainwater drains.

The project Integrated Urban Regeneration and Water Transport System in Kochi (IURWTS) aim is to restore the city's relationship with canals which were used for navigation until a few decades ago. Now Kochi is facing severe waterlogging and a reason for that is poor maintenance of canals. This is also emphasis an urgent need to rejuvenate the Kochi's canal network. Through IURWTS Government of Kerala is planning to regenerate five major canals and restore them for the people of Kochi.

1.2. Background of the study

Integrated Urban Regeneration and Water Transport System Project (IURWTS) is a comprehensive efforts of Government of Kerala to rejuvenate the urban life of Kochi City by augmenting five Major canals which are the lifeline of City life in terms of water flow and movement of Vessels. The project also aimed to upscale the standard of human life in both sides of the canal by providing healthy environment. 95 % of the Kochi City is surrounded by water bodies and canals.

Five major canals which are having total length of 35km are playing a significant role in the urban life of Kochi City especially in travel and transportation of goods. Historians say that these canals were the major transportation means even before 50-60 years ago. The tide occurred in the backwaters ensure the inflow and out flow of water through the canal. But the inland waterways have been neglected due to the fast development occurred in the roads and rail transportation. The unscientific waste management and dumping of waste into the canal created a dysfunctional in the water ways. But now the Thevara - Perandoor Canal, Thevara Canal, and Market Canal, Chilavannoor Canal and Edappally Canal and their tributary canals is the drainage carrier of the city. But encroachments, Unlawful constructions on banks, putting drainage outlets to the canal etc made the canal become a drainage channel. Many a place the above canals except, Thevara and Market Canal having a width of 2 to 4 mts only. The aim of the project is to develop transportation through canals, regeneration of Kochi city on development basis, strengthen the tourism, and improve the quality of life of the Kochi city and urbanization with proper waste management systems. With the completion of this project, Kochi will have a waterway network of world-class standards, akin to cities like Venice, London and Amsterdam. The project will also improve Kochi's inter-city connectivity by making the canals navigable and double as feeder service to existing public transport systems. Five of Kochi's major canals, covering a total distance of 34 km will be revived under this project. This includes the Edappally Canal (11.15 km), Chilavanoor Canal (11.023 km), ThevaraPerandoor Canal (9.84 km), Thevara Canal (1.41 km), and Market Canal (0.66 km).

As per plans, these canals will be thoroughly cleaned and freed from pollutants using high-efficiency independent sewage treatment plant and disposal methods. This will curb sewage outfalls, reduce the risk of flooding and help retain and replenish water by ensuring smooth flow. All five canals will be included in the Integrated Urban Regeneration and Water Transport System Project (IURWTS).

As per G.O.(Ms) No.1/2017/CSIND dated 25/03/2017 issued by the Coastal Shipping and Inland Navigation (A) Department, entrusted NATPAC for conducting the feasibility study, for the project "Integrated Urban Regeneration and Water Transport System in Kochi (IURWTS) Project" an Integrated Water Transport Project linking the canals related to Kochi City. Thereafter a Social Impact Assessment Study is conducted for the Rehabilitation and Resettlement of project affected people who will be displaced by the IURWTS project. The

study was completed in 2018 and submitted the report. Now the requisition agency of the IURWTS ie Kochi Metro Rail Ltd demanded a revalidation of the data mentioned in the Social Impact Assessment Study before preparing the DPR. Therefore the assignment was included in the TOR of the official consultant agency of the project ie Aneta Unihom JV. The Consultant agency Aneta - Unihom JV appointed Kerala Voluntary Health Services to do the assessment through a field study by using Social Impact Assessment Tools. This is the background of this report.

1.2.1. Study Approach

The land which proposed to be acquired for the project is owned by 1641 land Holders and occupants of Kochi Corporation, Thrikkara, Maradu and Kalamassery municipalities of Ernakulam district. Stake holder analysis was conducted and find out key stake holders and their interest and involvement in the proposed acquisition process. After the secondary data collection Social Impact Assessment Unit developed a questionnaire for social survey and visited all Title Holders and collected opinion, family details, Socio-Economic details and suggestions. Apart from this SIA team has conducted discussion and consultation with Local Body Representatives and local public and recorded their suggestions and opinion. The study also used transit walk and observation visit to cross check the suggestions and grievance which were recorded.

1.2.2. Methodology & Tools

The study team reviewed the relevant and available documents in Kochi Corporation, Greater Cochi Development Authority and different municipalities. SIA unit had also examined the records and documents and made a site visit along with the corporation and municipal councilors for area identification and information dissemination. SIA team had also conducted a one to one discussion and consultation with all Title Holder. Although SIA team had collected details by using pre prepared questionnaire. SIA team also had discussion and consultation with Local Body Representatives and local public. The study Team also used transit walk and observation tools to cross check the Suggestions and grievance which were recorded.

1.3. Benefit of the Project

The project Integrated Urban Regeneration and Water Transport System in Kochi (IURWTS) aim is to restore the city's relationship with canals which were used for navigation until a few decades ago. Now Kochi is facing severe waterlogging and a reason for that is poor maintenance of canals. This is also emphasis an urgent need to rejuvenate the Kochi's canal network. Through IURWTS Government of Kerala is planning to regenerate five major canals and restore them for the people of Kochi.

The five major canals which are covering a total length of 34 km are Edappally Canal (11.15 km), Chilavanoor Canal (11.023 km), Thevara-Perandoor Canal (9.84 km), Thevara Canal (1.41 km), and Market Canal (0.66 km). These canals will be cleaned and free from the pollutants by setting up independent sewage treatment plant and disposal systems, curbing sewage outfalls, reducing the risk of flooding, and retaining and replenishing water by ensuring its smooth flow. The accessibility will be improved by making canals navigable, improving connectivity and enhancing cross-connectivity by making the navigable routes a feeder service to the existing public transport systems.

Unihorn India Pvt.Ltd who works for the requisition agency ie Kochi Metro Rail Ltd decided to conduct a social impact assessment study with special focus on Rehabilitation and Resettlement of Project affected and displaced families. The project would acquire land from banks of Thevara-Perandoor, Edappally, Chilavanoor, Thevara and Market canals of Ernakulam district. The preliminary survey identified 14,481 people and 3264 buildings as project affected. The proposed project of widening the canal and improve the water transport will boost the tourism and business transport of the commercial capital of Kerala ie Kochi.

4. Project Location

The proposed project is located in 27 Corporation wards of Kochi corporation and 12 Municipal wards of Maradu, Trikkakara and Kalamaseery Municipalities of Ernakulam district Kerala. Geographically the area is situated between Northern Latitude 9°58' and Eastern longitude 76°16'. The project area is characterized by sandbars running in the North-South direction with tidal canals in between. The importance of the location in the region is evident from its population size and growth. The project area Agglomeration ranks seventeenth with a population of about 21.17 lakh. It is the largest urban agglomeration in the state. Being a coastal area majority of the project area is within the low land regions. The average altitude towards the eastern fringes is about 7.5 m above MSL, and towards the west the altitude is less than one meter on an average. The whole of the land slopes gradually from east to west. The flat terrain of the central part of the project area with the low altitude interspersed with a network of canal system provide link to the backwaters.

The annual variation of temperature in the Project region is between 220 C and 320 C and a more or less uniform temperature exists throughout the year. Because of the nearness to the sea and due to the large area of backwaters in the region, the humidity is high all-round the year. The area has a tropical climate with intense solar radiation and abundant precipitation. The region experiences only two major seasons, namely the dry season and the wet season, as in all other places in Kerala. The wet season is usually associated with the months in which the south-west and north-east monsoon occur. The northeast monsoon commences in October and continues till November. The rain fall varies from 1500 mm to 2000 mm during south west monsoon and 400 to 700 mm during the north-east monsoon. The maximum annual rainfall in the region is around 3000 mm.

The soil of the project location can be broadly classified into two categories viz. alluvial and lateritic. The lateritic soil covers the eastern portion of the area. The soil is porous and well drained and hence suited for all garden works. On removal of the top soil, laterite is present as a homogeneous mass which can be cut as building blocks. The alluvial soil is the characteristic type seen over the remaining part of the location. It has been formed from the deposition and consolidation of river discharge laden with fine silt and clay. Soil exploration has revealed that this deposit is present even to a depth of about 50 metre from the sea level. This fact presents the unique foundation engineering problems of this area.

Banks of the five major canals which covering a total length of 34 km ie. Edappally Canal (11.15 km), Chilavanoor Canal (11.023 km), ThevaraPerandoor Canal (9.84 km), Thevara Canal (1.41 km), and Market Canal (0.66 km) are the project affected area. The locations in which these canals are flowing are the location of the project. Estimate shows that 8% of the total city area is coming under the location. Historians claimed that the city of Ernakulam grown up gradually in the banks of the canals because the major transport and trade means was the canals in ancient times. Therefore a thickly populated habitation is existing in the project area. The land use pattern shows that 73% are residential, 12. % are commercial 10% are Public or Government land and remaining in other use.

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1.5. The Canals under the Project

1.5.1. Thevara Canal

The canal originates from VenduruthyPuzha ($9^{\circ} 56' 37.20''\text{N}$ and $76^{\circ} 17' 32.50''\text{E}$) and connects with KundanoorPuzha ($9^{\circ} 56' 47.18''\text{N}$ and $76^{\circ} 18' 17.57''\text{E}$). This canal is linked with National Waterways No.3 and Thevera-Perandoor canal. The major places it passes through are Thevara market, Koithara and Kallumpalam.

The developed canal is having potential of connecting Chembakkara canal with Inland Water Authority of India (IWAI) terminal at Maradu. The total length of the canal is 1.41km. The average width and depth of the canal is 18.5m and 1m-1.5m respectively. The flow is towards western side and it is affected by the settlers through dumping of solid waste into the canal. The waste generated from the fish market situated on right bank at 0.2km chainage is another major source of pollution.

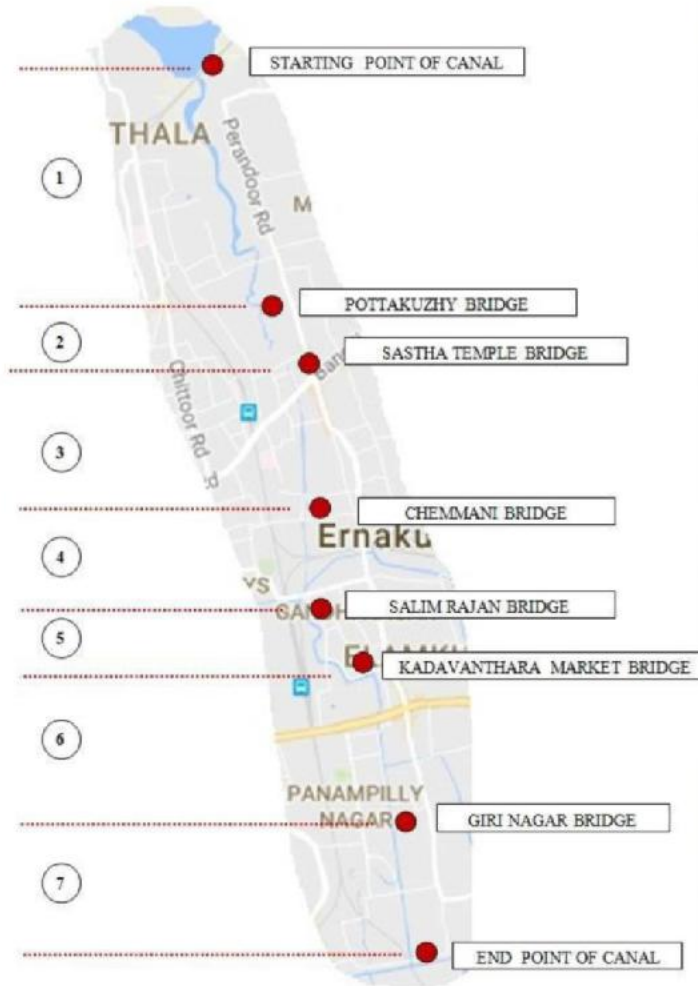




1.5.2.Thevara Perandoor

The canal starts from PerandoorPuzha at Railway bridge ($10^{\circ} 01' 12.00''N$ and $76^{\circ} 16' 56.00''E$) and connects Thevara canal at Railway bridge ($9^{\circ} 56' 44.37''N$ and $76^{\circ} 18' 02.45''E$). The canal passes through the major places like Perandoor, Vaduthala, Pachalam, Kaloor, Ernakulam South, Giri Nagar, KadavantharaandPanampilly Nagar. The total length of the canal is 9.84km. The width of canal is varying from 8.0m to 48m and the average width is 17.9m. The depth of canal varies between 0.6m and 1.0m.

The canal flow is maintained by Perandoorpuzha a branch of Periyarriver at northern end and Thevera Canal a branch of Chembakkara canal on southern end. The wider portion of canal exists between starting point (0.00km) and Sastha temple Road Bridge (3.45km). Due to metro construction along Kaloor road corridor the canal is blocked at 3.78km. The canal is stagnant between this point and Judges avenue road bridge due to absence of flow of water. Another bottleneck at chainage 5.33km 5.356km is observed i.e., the canal is partially blocked and a small channel from 5.40km is started again. The weeds growth is intensive at the section 5.40km 5.70km due to blockage of canal flow. The wider portion of the canal again starts from SalimRajan road bridge(5.75km) and extended up to ending point of the canal.



1.5.3. CHILAVANOR CANAL

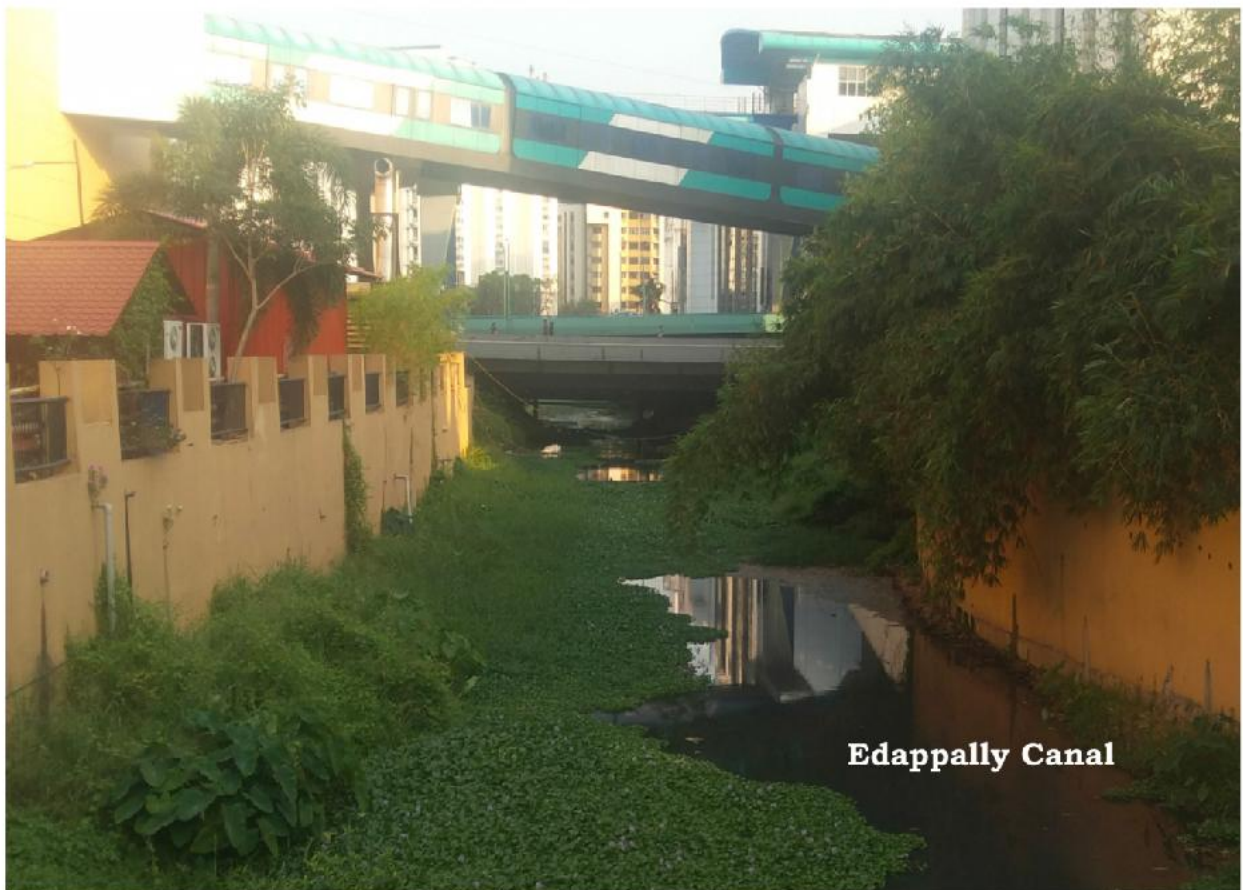
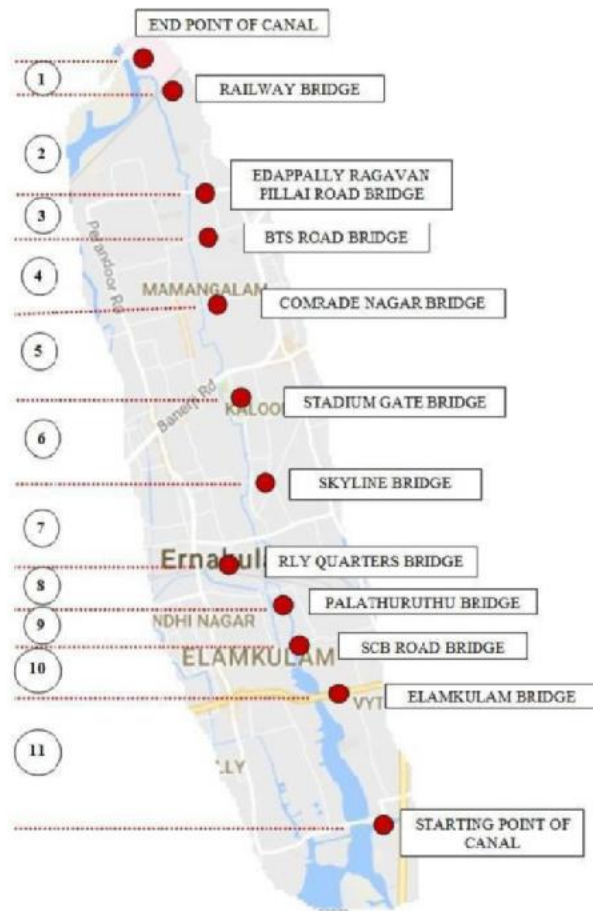
Chilavanoor canal originates from Champakkara Canal (09° 57' 11.27"N and 76° 18' 49.22"E) of National Waterway- 3 and ends at PerandoorPuzha (10° 01' 53.39"N and 76° 17' 23.49"E) back side of the Amritha Institute of Medical Science (AIMS), Edapally. The canal passes through Chilavanoor, Elamkulam, Kathrikkadavu, Kaloor, International Stadium and Elamakara. The wider portion of the canal is existing for the stretches starting point of the canal to SCB road bridge and EdapallyRagavan bridge to end point of the canal. The major bottle neck is missed link between 6.79km -6.86km i.e. the canal portiopassingKaloor - Palarivattom road. Due to metro construction the canal is diverted through a pipeline and it passes through KSEB Sub-Station, Kaloor premise covered by concrete slabs. The same situation is extended up to the chainage 7.19km i.e., endof KSEB, Kaloor sub-station end. Again the canal is covered by RCC slab between the sections 7.25km 7.30km and 7.585km 7.65km. Similarly, average width of 1.5m RCC slabs of 5 Nos. exists between Keerthinagarbridge to BTS Road Bridge. The canal is divided in to eleven stretches according to width, depth, population density and accessibility. The Figure 6.2 shows the study area and its divisions. Total length of the canal is 11.023 km. Canal width varies from 3.5m to 200m and the average width is 34m and depth ranges between 0.6m to 1.1m.





1.5.4. Edappally Canal

Edappally canal starts from Muttar Bridge ($10^{\circ} 02' 36.78''$ N and $76^{\circ} 18' 12.40''$ E) and connects with Champakkara Canal (part of NW-3) near Eroor Bridge ($09^{\circ} 58' 46.47''$ N and $76^{\circ} 19' 56.29''$ E) as its end point. It passes through Edappally, Vennala, Chakkaraparambu and Chalikkavattom. This canal provides the shortest link between the two industrial hubs of Kochi namely - Udyogamandal and Ambalamugal. Improvement of this canal will facilitate reduction in transportation cost of cargo movement between these two industrial hubs. Total length of the canal is 11.15km. Canal width varies from 28.72m (average) and depth ranges between 0.8m to 1.30m (average). It is perennial water body and presently, there is no visible water flow in most of the portions of the canal.



Edappally Canal

1.5.6. Market Canal

The canal starts from Ernakulam channel at Rainbow bridge (09° 58 47.65 N and 76° 16 30.15 E) and it ends at Banerji Road (09° 59 05.09 N and 76° 16 34.31 E). The Market Canal is passing through Broadway and the Market road - the commercial hub of the City - where the bulk of wholesale and retail activities of the city take place. Even though the length of the canal is small, is having tourism potential at starting point i.e., The Marine drive and possibility of cargo movement through Rainbow bridge to market area. The total length of the canal is 0.66km. The average width and depth of the canal is 9.94m and 0.6m-1.0m respectively.





1.6. Size and Attributes of Land Acquisition

Land Acquisition Authority

District Collector, Ernakulam is the Land acquisition Authority. Under his direction Dy. Collector (LA), Ernakulam and Tahasildars prepares the acquisition details including land sketched and extent of acquisition etc. No Boundary stones placed or boundary marked for the project.

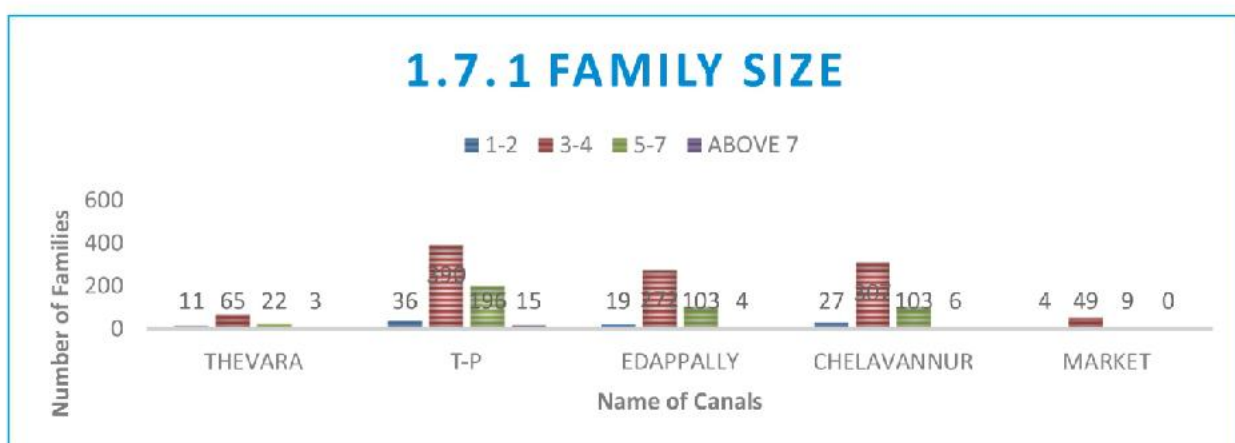
1.7. Details of project affected families

The study finds that out of one thousand six hundred and forty one families are affected by the project. The cast distribution shows that 8% Titleholders belongs to Scheduled Cast and 1% are Scheduled Tribe. But 35% of title holders are belongs to Other Backward Community. The education qualification shows that all THs are literate and 82 % are having SSLC and above qualifications. 13% of affected families are squatters and 2% are encroachers. Religious distribution shows that 36% are Hindus and 13% are Muslims and 51% are Christians. The economic status reveals that 43 Title holders are having monthly income of less than Rs.10, 000. 14% families are having BPL status in ration cards. Occupational distribution is showing that self-employment is dominating, followed by business. 95% of Title Holders are married. 66% of the families are having the size of 3-4 members. Only 21% of title holders claimed that they have monthly income more than Rs.24,000/- In the other side 43% title holders claimed that they have monthly income less than Rs.10,000/-

Name of Canal	Total Families Affected	Title Holders					Squatters					Encroachers				
		Total	SC	ST	OBC	General	Total	SC	ST	OBC	General	Total	SC	ST	OBC	General
Thevara	101	95	17	0	27	51	2	0	0	2	0	4	2	0	1	1
Thevara – Perandoor Canal	637	475	5	0	159	311	145	69	6	54	16	17	3	0	3	11
Edappally Canal	398	356	4	4	109	239	29	17	0	9	3	13	1	0	0	12
Chilavanoor Canal	443	396	1	0	152	243	31	13	2	11	5	16	0	0	6	10
Market Canal	62	62	1	1	33	27	0	0	0	0	0	0	0	0	0	0
Total	1641	1384	28	5	480	871	207	99	8	76	24	50	6	0	10	34

Name of Canal	Size of Family				Total
	1-2	3 - 4	5-7	Above 7	
Thevara	11	65	22	3	101
Thevara - Perandoor	36	390	196	15	637
Edappally	19	272	103	4	398
Chellavannur	27	307	103	6	443
Market	4	49	9	0	62
Total	97	1083	433	28	1641

Table 1.7 .1 Distribution of Project Affected Title Holders



1.8. Details of the acquiring land

The total land need to acquire for the project is approximately 41 Hectares. 1151 structures are affected by the project. Out of it 311 are displaced. 33% of acquiring land is owned by Government. Only 41% of acquiring land is in the possession of title holders. All the acquiring land is commercial in nature except few hectares of land with Orchard. 32% of the land is having structures. 80% of the acquiring land is not having any type of road frontage.

Name of Canal	Land Required in Hectore	Govt. Land	Govt. Land in Private Possession	Private land	No. of Residence displaced											
					Squatter				Encroacher				Owner			
					Multi storied	Pucca	Hut with shed	Total	Multi storied	Pucca	Hut with shed	Total	Multi storied	Pucca	Hut with shed	Total
Thevar a Canal	1.00 Htr.	0.90 Htr	0.10 Htr	0	0	1	1	2	2	2	0	4	0	2	0	2
Thevar a – Perandoor Canal	12.5 Htr.	4.20	3.40	4.90 Htr.	0	13	123	145	5	12	0	17	3	17	0	20
Edappally Canal	9.00 Htr.	3.90	2.30	2.80 Htr.	0	0		29	4	9	0	13	4	6	0	10
Chilavanoor Canal	17.5 Htr.	4.10	3.80	9.60	0	13	0	31	8	8	0	16	4	18	0	22
Market Canal	1.00 Htr.	0.58	0.05	.07	0	0	0	0	0	0	0	0	0	0	0	0
Total	41.00	13.68	9.65*	17.37	0	27	124	207	19	31	0	40	11	43	0	54

Table 1.8.1.DISTRIBUTION OF ACQUIRED LAND BASED ON OWNERSHIP &RESIDENTIAL PROPERTIES AFFECTED

Name of Canal	Total Length (Both Side)	Access with		
		Approach road (k.m.)	Walk Way	No Access
Thevara Canal	2.800	1.200	0	1.600
Thevara – Perandoor Canal	19.5	5.950	0.960	12.590
Edappally Canal	22.30	1.150	1.200	19.950
Chilavanoor Canal	22.5	1.800	0.600	20.100
Market Canal	1.20	0.900	0	0.300

Table 1.8.2.DISTRIBUTION OF THE PROJECT AREA BASED ON ACCESS

Name of Canal	Land Required in Hectare	Land with Orchard	Barren Land	Land with Structure (Hectare)
Thevara	1.00 Hectare	0	0	0.1
Thevara – Perandoor Canal	12.5 Hectare	1.5	1.7	5.1
Edappally Canal	9.00 Hectare	0.8	1.2	3.1
Chilavanoor Canal	17.5 Hectare	1.3	2.0	4.60
Market Canal	1.00 Hectare	0	0	0.12
Total	41.00 Hectare	3.6	4.9	12.92

Table 1.8.3 TYPE OF PRIVATE LAND ACQUIRED

1.9. Socio Economic Profile of the Influence Area

1.9.1 Socio Economic pattern

1.9.1.1 Kochi Corporation Wards: There are 41 Corporation wards of Kochi Corporation are coming under the influence of the project. As per the 2011 censuses total population of Kochi corporation is 6,33,553 and density of population 5,914/km². The average literacy rate is 96.29% (Male:97.64 and Female:94.99). Sex ratio shows that 1000 Males having 1030 female and it is just below the state average. 3.85% of population are belongs to scheduled cast (socially vulnerable). Only 2,344 people are schedule tribe (Indigenous). As per the 2011 censuses 58% of population is unemployed.

1.9.1.2 Maradu Municipality: Five wards of Maradu Municipality coming under the project influence. Total population recorded in 2011 censuses is 44,704. Religious distribution says that 49.23% are Hindus, 35.67% are Christians and 14.87% are Muslims. Cast wise 8.81 % are scheduled cast and 0.58% are Scheduled tribes. Literacy rate is 85.5%. Sex ratio shows that 1000 male having 1016 female and it is below the state average.

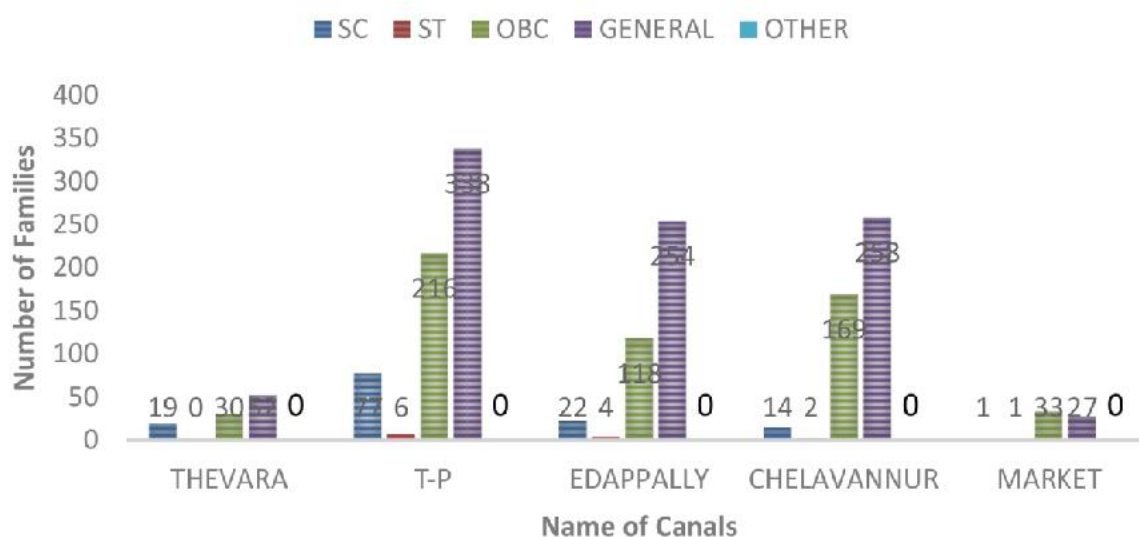
1.9.1.3. Trikkakkara Municipality: Seven wards of Trikkakkara Municipality coming under the influence of the project. As per the 2011 censuses the total population of the municipality is 77,319 and density of population is 2800/km². Religious distribution says that 49.42% are Hindus, 27.01% are Christians and 21.92% are Muslims. The Cast distribution shows that 15.71 % are Scheduled cast and 0.44% are scheduled tribes. Literacy rate is 93.75 and sex ratio is 1000: 1002.

1.9.1.4 Kalamassery Municipality: Three wards of Kalamassery Municipality coming under the project influence. As per the 2011 census the total population of the municipality is 70776 having literacy rate of 95.87%. Sex ratio is 1000:1011. Religious distribution says that 41.77% are Hindus, followed by 34.53% Muslims and 23.42% Christians. Cast distribution shows that 7.93% are scheduled cast and 0.54% is scheduled tribe.

Name of Canal	Social Category					Total
	Scheduled Cast (SC)	Scheduled Tribe (ST)	Other Back Ward Class (OBC)	General	Other	
Thevara	19	0	30	52	0	101
Thevara - Perandoor	77	6	216	338	0	637
Edappally	22	4	118	254	0	398
Chellavannur	14	2	169	258	0	443
Market	1	1	33	27	0	62
Total	133	13	566	929	0	1641

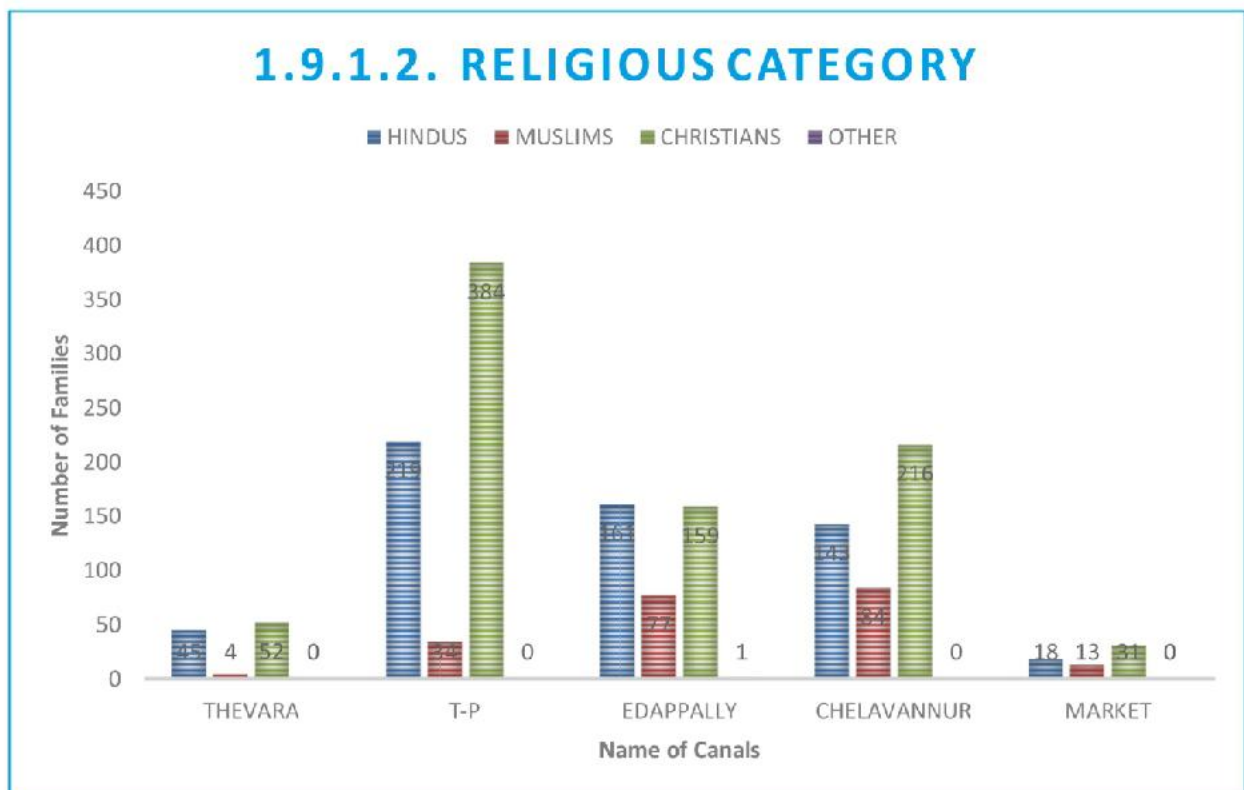
Table 1.9 .1.1 Social Category of Affected Families

1.9.1.1 SOCIAL CATEGORY



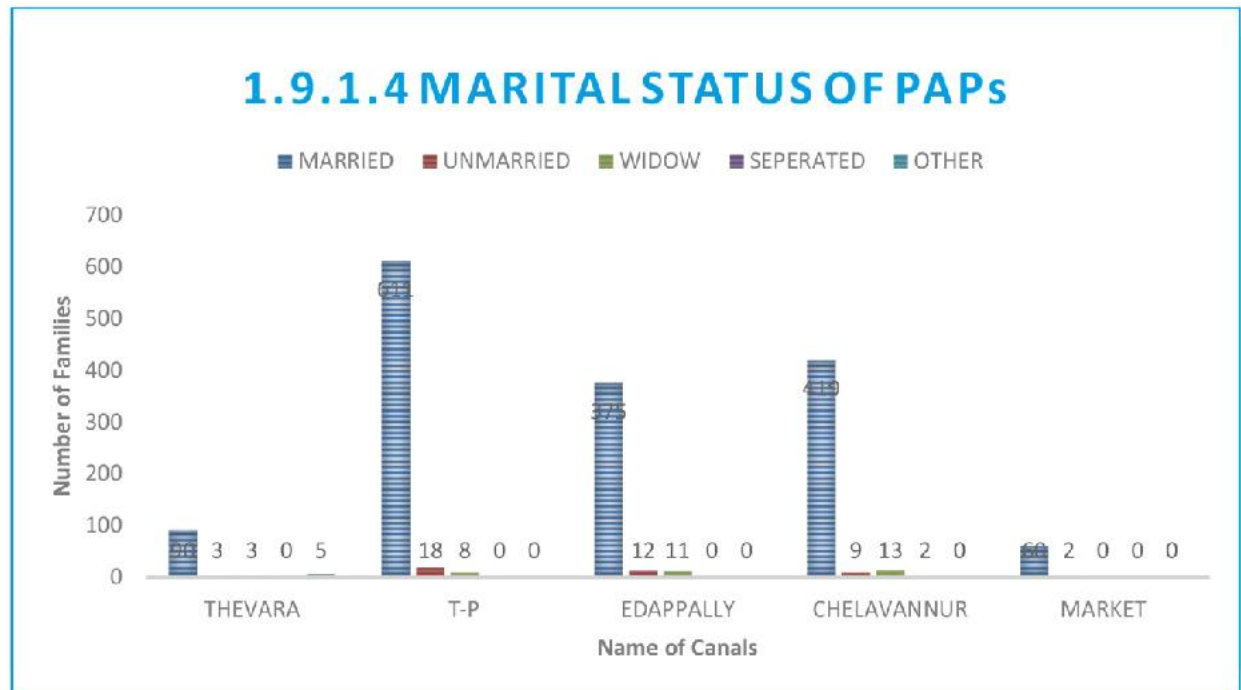
Name of Canal	Religious Category				Total
	Hindus	Muslims	Christians	Other	
Thevara	45	4	52	0	101
Thevara - Perandoor	219	34	384	0	637
Edappally	161	77	159	1	398
Chellavannur	143	84	216	0	443
Market	18	13	31	0	62
Total	586	211	842	1	1640

Table 1.9 .1.2. Religious wise distribution of Affected Families



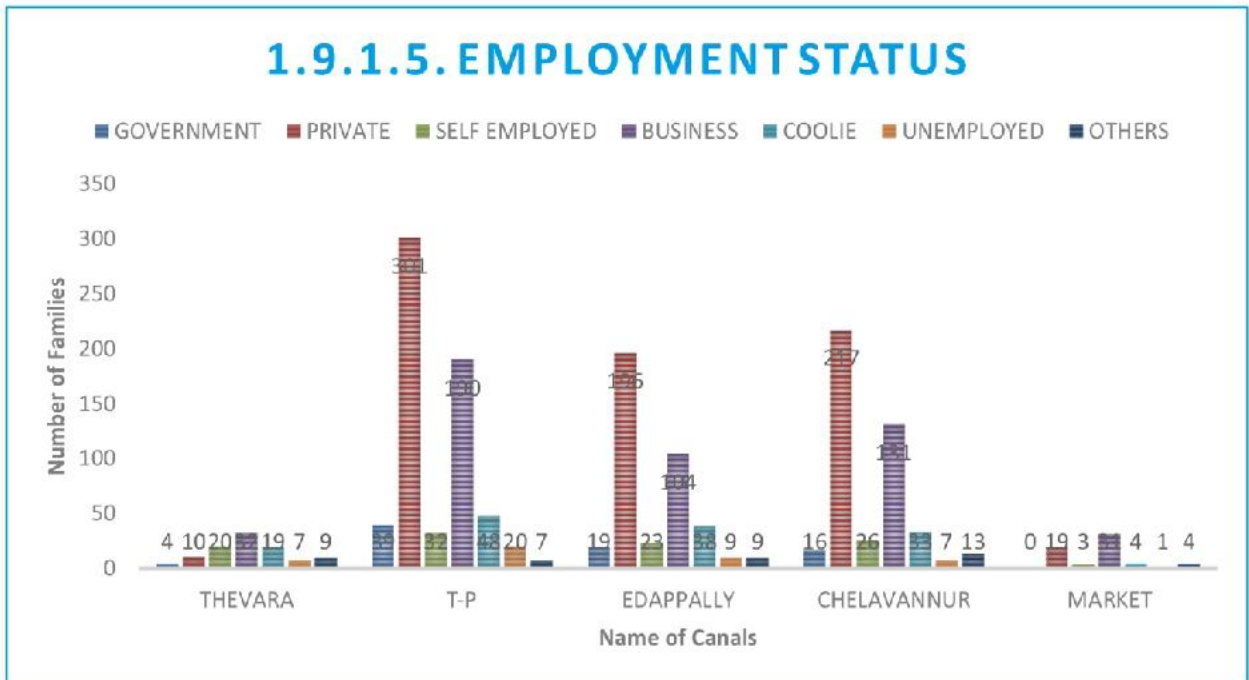
Name of Canal	Marital Status of PAPs					Total
	Married	Unmarried	Widow	Separated	Other	
Thevara	90	3	3	0	5	101
Thevara - Perandoor	611	18	8	0	0	637
Edappally	375	12	11	0	0	398
Chellavannur	419	9	13	2	0	443
Market	60	2	0	0	0	62
Total	1555	44	35	2	5	1641

Table 1.9 .1.4 Marital Status of Affected Title Holders



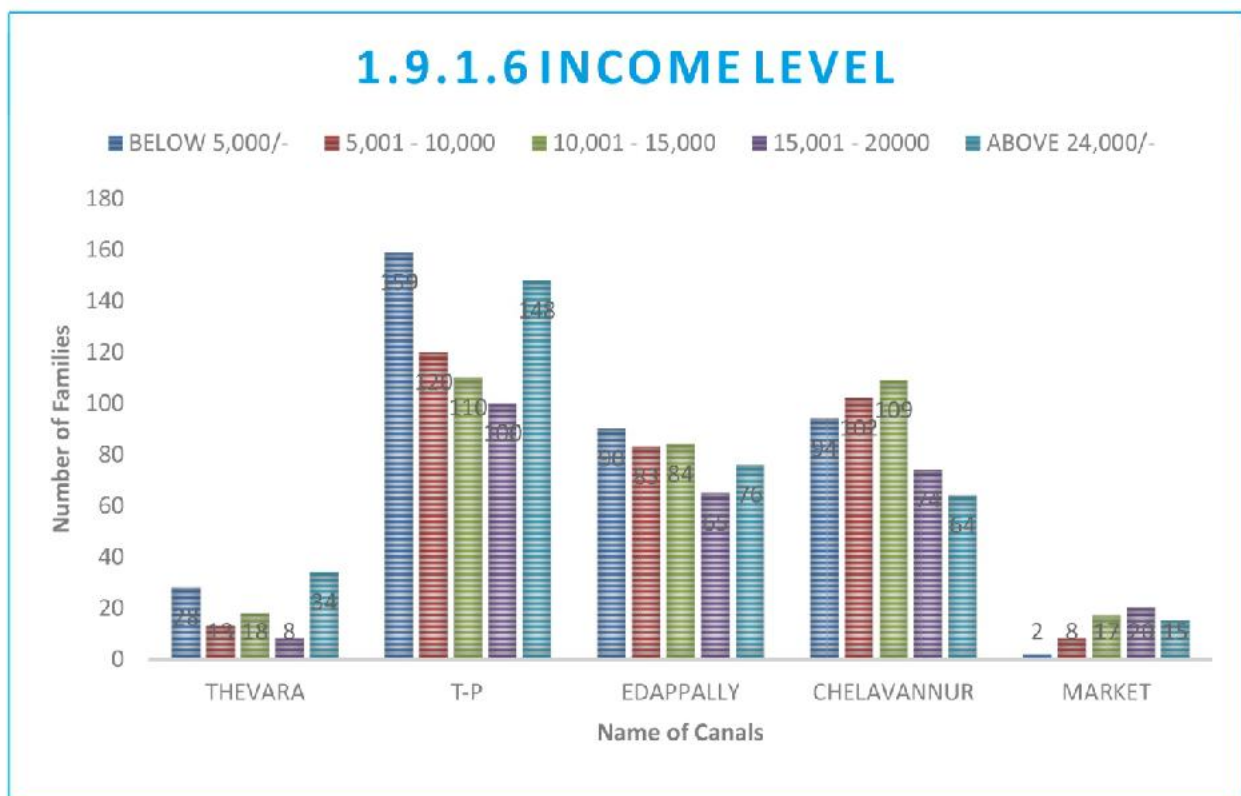
Name of Canal	Employment Status							Total
	Government	Private	Self-Employed	Business	Coolie	Unemployed	Others	
Thevara	4	10	20	32	19	7	9	101
Thevara - Perandoor	39	301	32	190	48	20	7	637
Edappally	19	196	23	104	38	9	9	398
Chellavannur	16	217	26	131	33	7	13	443
Market	0	19	3	31	4	1	4	62
Total	78	743	104	488	142	44	42	1641

Table 1.9 .1.5 Distribution of Title Holders on Employment Status



Name of Canal	Monthly Income Level					Total
	Below 5,000	5,000 to 10,000	10,000 to 15,000	15,001 to 20,000	Above 20,000	
Thevara	28	13	18	8	34	101
Thevara - Perandoor	159	120	110	100	148	637
Edappally	90	83	84	65	76	398
Chellavannur	94	102	109	74	64	443
Market	2	8	17	20	15	62
Total	373	326	338	267	337	1641

Table 1.9 .1.6 Monthly Income base distribution of Title Holders



1.10. Alternatives Considered

Sl.No.	Alternatives proposed	Analysis
1	Deepening the existing canals and widen the necessary areas without displacing structures.	This will not help to achieve the project objective.
2	Widen the canals throughout the length with 20.5 mtr width and displaced all structures in the canal side for walk way/road.	Huge number of structures will be displaced.

Table 1.10 .1. Alternative proposed

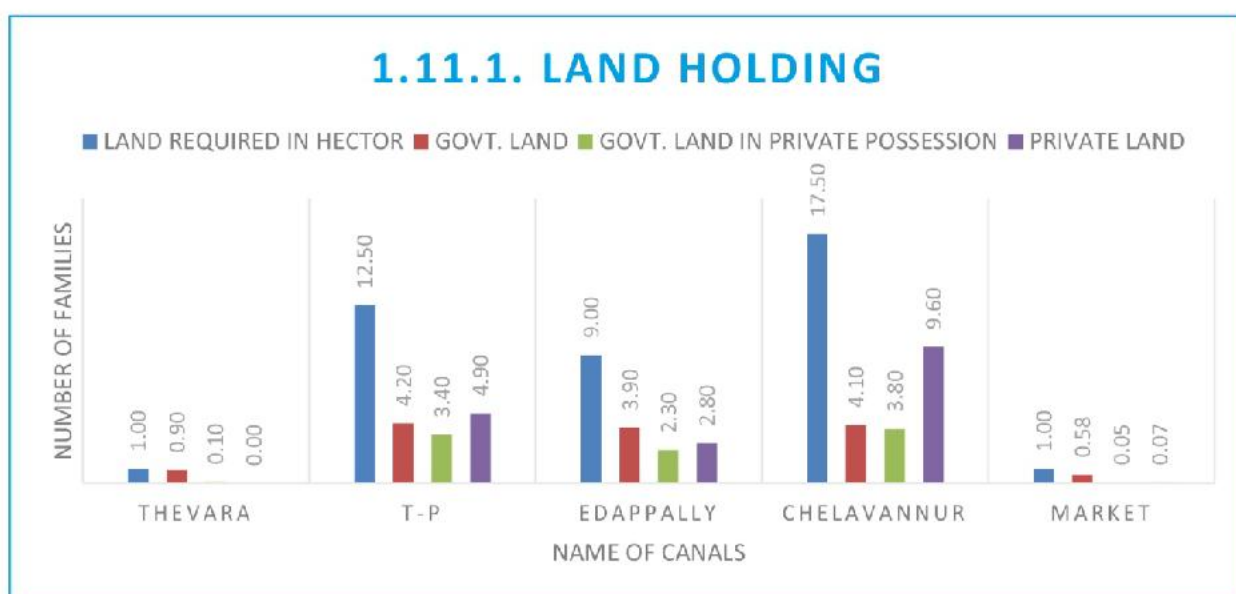


1.11. Social Impact

The major impact of the project is the loss of land and structure. The study shows that 653 residential structures and 114 commercial structures are affected by the project. 41 hectares of land needs to be acquired. Out of it 13 hector is having structures. 514 trees are needs to be cut down and 548 livestock units either affected or need to be shifted. 207 squatter residences are affected by the project. Most of these squatters are living in four major colonies. 40 encroachers are also losing their residential structure. The positive impact of the project is the up gradation of major canals with navigation facilities. This may improve environmental hygiene in an around the canal and will solve water logging problems in the city.

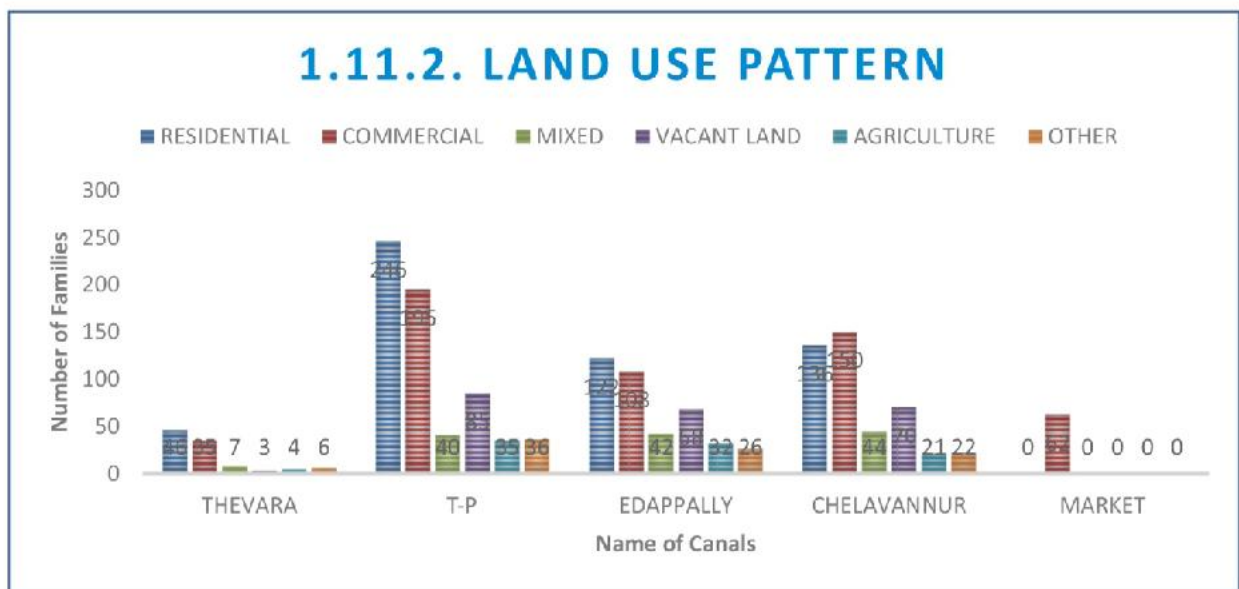
Name of Canal	Land Holdings				
	Land Required in Hector	Govt. Land	Govt. Land in Private possession	Private Land	Total
Thevara	1.00	0.90	0.10	0	2
Thevara - Perandoor	12.5	4.20	3.40	4.90	25
Edappally	9.00	3.90	2.30	2.80	18
Chellavannur	17.5	4.10	3.80	9.60	35
Market	1.00	0.58	0.05	0.07	1.7
Total	41	13.68	9.65	17.37	81.7

Table 1.11.1.Land Holding Pattern



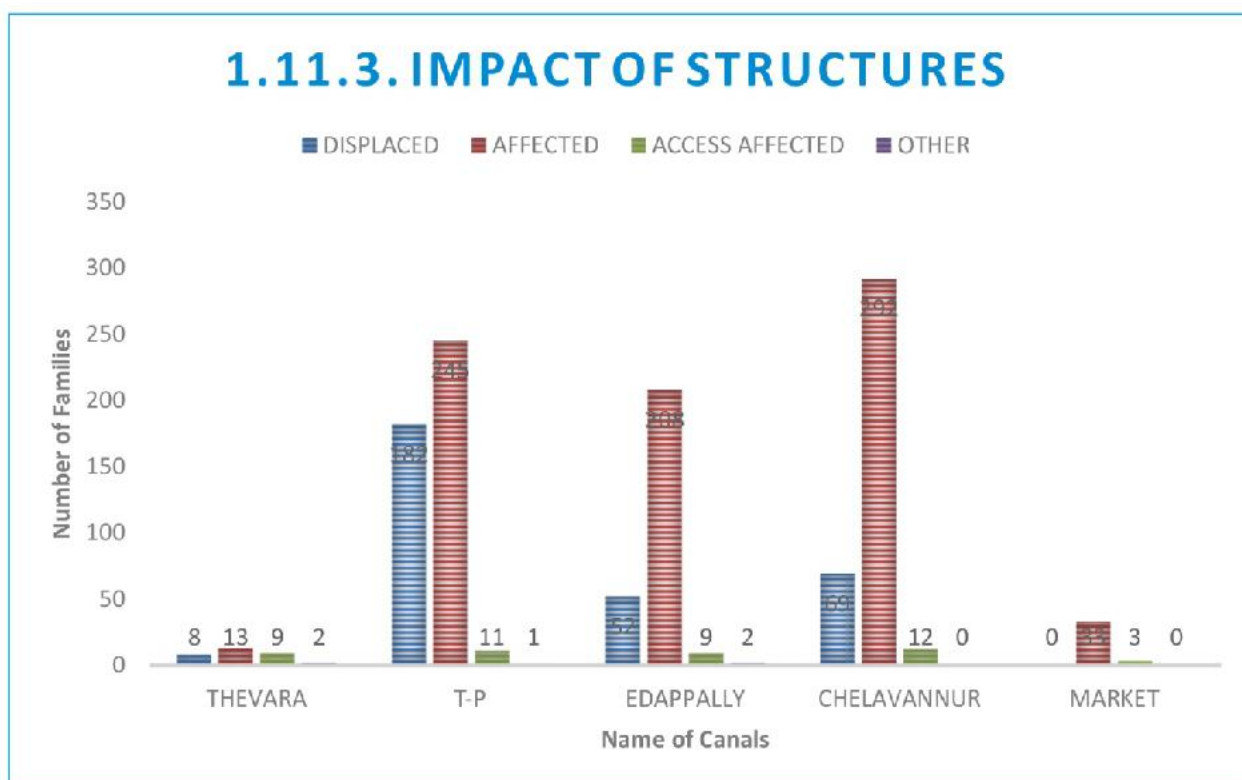
Name of Canal	Land Use Pattern						Total
	Residential	Commercial	Mixed	Vacant land	Agriculture	Other	
Thevara	46	35	7	3	4	6	101
Thevara - Perandoor	246	195	40	85	35	36	637
Edappally	122	108	42	68	32	26	398
Chellavannur	136	150	44	70	21	22	443
Market	0	62	0	0	0	0	62
Total	550	550	133	226	92	90	1641

Table 1.11.2 Land Use Pattern



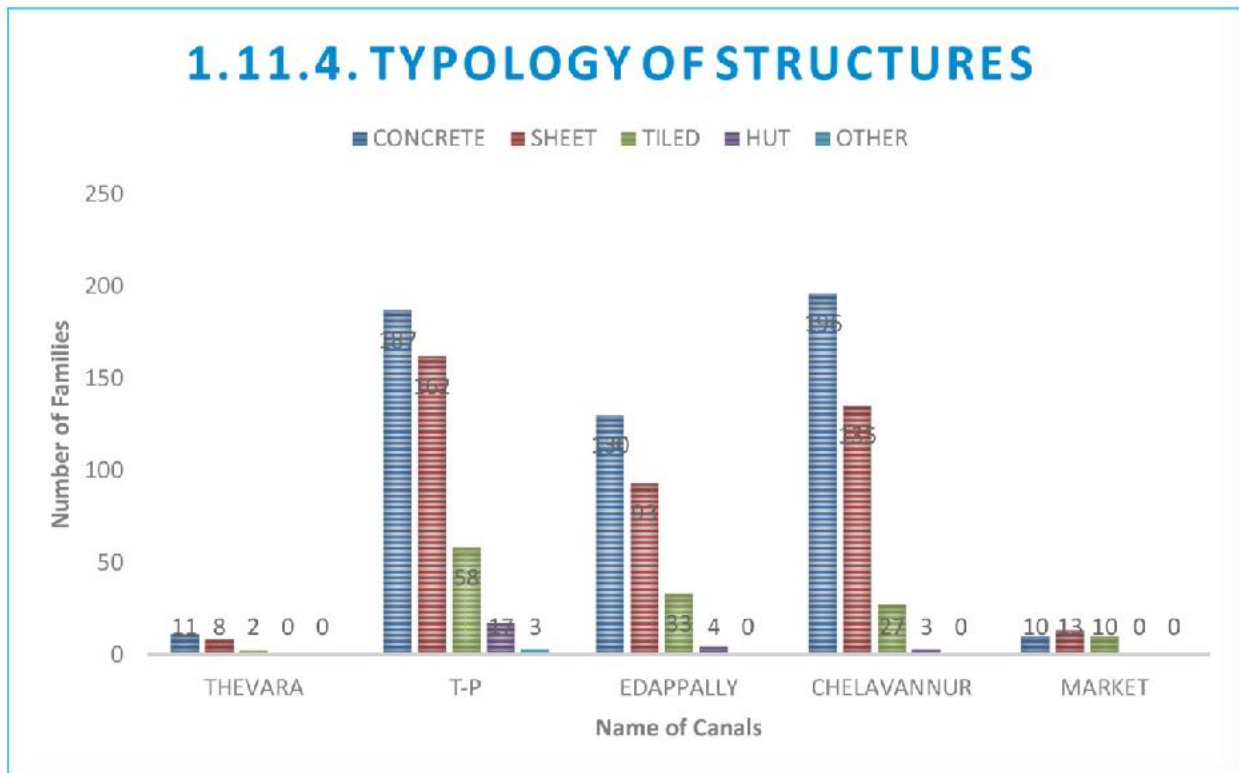
Name of Canal	Impact on Structure				
	Displaced	Affected	Access affected	Other	Total
Thevara	8	13	9	2	32
Thevara - Perandoor	182	245	11	1	439
Edappally	52	208	9	2	271
Chellavannur	69	292	12	0	373
Market	0	33	3	0	36
Total	311	791	44	5	1151

Table 1.11.3. Impact on Structure



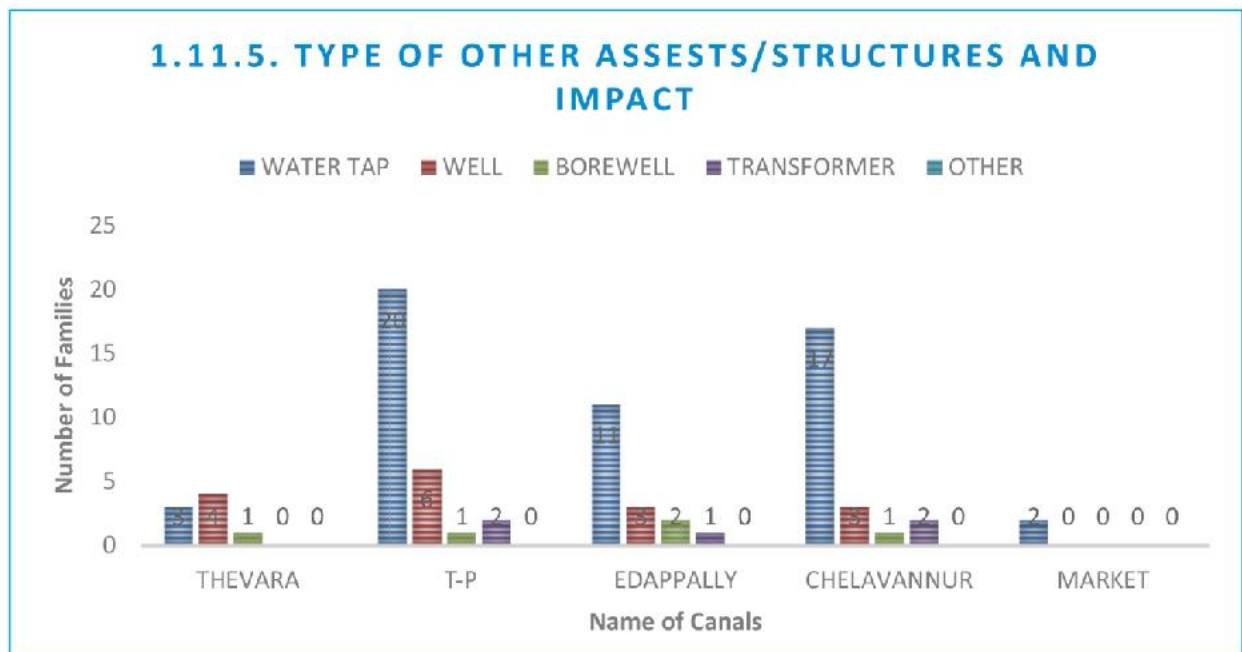
Name of Canal	Type of structure					Total
	Concrete	Sheet	Tiled	Hut	Other	
Thevara	11	8	2	0	0	21
Thevara - Perandoor	187	162	58	17	3	427
Edappally	130	93	33	4	0	260
Chellavannur	196	135	27	3	0	361
Market	10	13	10	0	0	33
Total	534	411	130	24	3	1102

Table 1.11.4.Type of Structure



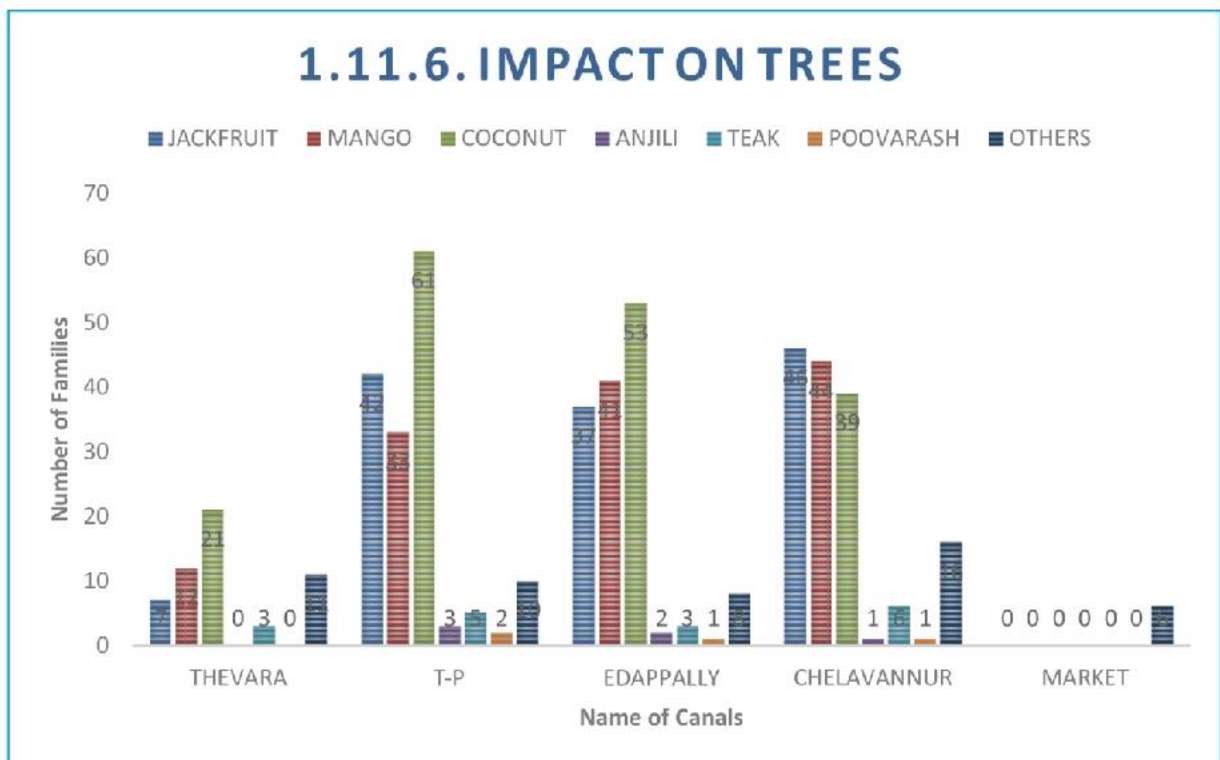
Name of Canal	Structure Use Pattern					Total
	Water Tap	Well	Bore well	Transformer	Other	
Thevara	3	4	1	0	0	8
Thevara - Perandoor	20	6	1	2	0	29
Edappally	11	3	2	1	0	17
Chellavannur	17	3	1	2	0	23
Market	2	0	0	0	0	2
Total	53	16	5	5	0	79

Table 1.11.5 Structure Use Pattern



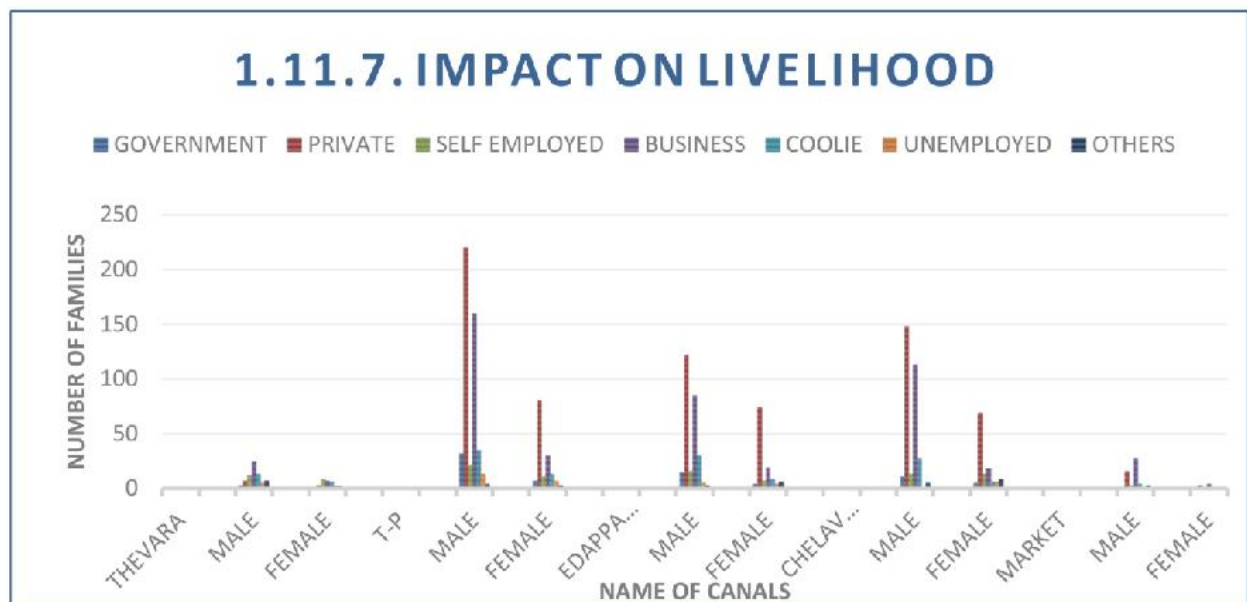
Name of Canal	Tree Pattern							Total
	Jack Fruit	Mango	Coconut	Anjili	Teak	Poovarash	Oth ers	
Thevara	7	12	21	0	3	0	11	54
Thevara - Perandoor	42	33	61	3	5	2	10	156
Edappally	37	41	53	2	3	1	8	145
Chellavannur	46	44	39	1	6	1	16	153
Market	0	0	0	0	0	0	6	6
Total	132	130	174	6	17	4	51	514

Table 1.11.6. Impact on Trees



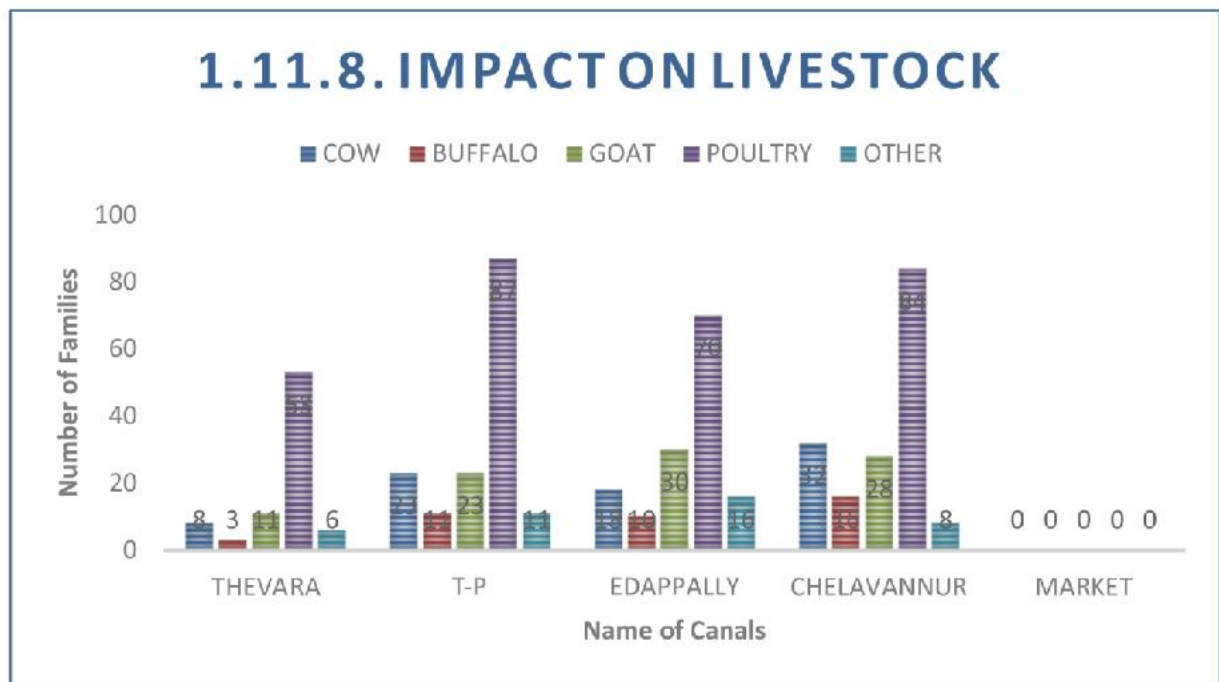
Name of Canal	Gender	Employment Status							Total
		Government	Private	Self-Employed	Business	Coolie	Unemployed	Others	
Thevara	Male	3	7	12	25	13	5	7	72
	Female	1	3	8	7	6	2	2	29
Thevara - Perandoor	Male	32	220	21	160	35	13	4	485
	Female	7	81	11	30	13	7	3	152
Edappally	Male	15	122	16	85	30	5	3	276
	Female	4	74	7	19	8	4	6	122
Chellavannur	Male	11	148	13	113	27	1	5	318
	Female	5	69	13	18	6	6	8	125
Market	Male	0	16	3	27	4	1	3	54
	Female	0	3	0	4	0	0	1	8
Total	Male	61	513	65	410	109	25	22	1205
	Female	17	230	39	78	33	19	20	436

Table 1.11.7. Impact on Livelihood



Name of Canal	Livestock Use Pattern					
	Cow	Buffalo	Goat	Poultry	Other	Total
Thevara	8	3	11	53	6	81
Thevara Perandoor	23	11	23	87	11	155
Edappally	18	10	30	70	16	144
Chellavannur	32	16	28	84	8	168
Market	0	0	0	0	0	0
Total	81	40	92	294	41	548

Table 1.11.8. Impact on Livestock



1.11.9. Families need to support R&R in specified colonies

Sl.No	Name of Colony	Total Houses	Houses Surveyed
1	P&T	91	91
2	Udaya	150	10
3	Krithala	60	9
4	Kudumbi	31	7
Total		332	117

1.11.10. Response to Public Importance

Sl No	Public Importance Indicators	+ ve	-ve	No response
1	Community Support	1401	111	129
2	People's Benefit	1518	97	16
3	Community Empowerment and Ownership	1006	605	30
4	Public Health Importance	1603	36	2
5	Environment Friendly	1336	284	21
6	Economic Opportunity	1117	303	221
Total		7981 (81%)	1436 (15%)	419 (4%)

1.12. Mitigation Measures

Sl.No.	Risk Assumed	Approach	Mitigation Strategy
1	Loss of Residential House	Compensation and Rehabilitation	Compensate the loss and develop rehabilitation package.
2	Loss of Residential Building	Compensation	Compensate the loss
3	Loss of Part of Residence	Compensation & Resettlement	Compensate the loss and resettle the family.
4	Loss of Commercial Building	Compensation	Compensation & Resettlement of Tenants
5	Loss of part of Commercial Building	Compensate	Compensate the loss
6.	Loss of Business	Compensation	Compensate the Loss
7.	Loss of water bodies like well, pounds etc.	Control, Avoid	Saving & protecting

8.	Loss of structure	Compensation	Compensate the lose
9.	Loss of part of structure	Compensation	Compensate the loss
10 .	Loss of existing access	Control	Study and include the plan of resettlement in the implementation plan
11 .	Formation of uneconomic holdings(bit lands)	Control	Acquire the uneconomic holdings
12	Loss of employment	Compensation / Rehabilitation and Resettlement	Compensation & Resettlement
13	Loss of household wells	Control / Compensation well	Save / Compensation
14	Loss of community tube well	Control & Resettlement	Save / Resettlement
15	Loss of Parking areas	Compensate & Control	Compensate the loss
16	Loss of Access to properties	Control & Resettle	Prepare a resettlement plan in consultation with project affected families.
17	Loss of access to sub roads	Control & Resettle	Prepare a resettlement plan in consultation with project affected families.
18	Loss of House' Setback to canal	Control & Resettle	Resettle the access/ Establish safety measurers
19	Loss of cultural properties	Control & Resettle	Resettle the access / Establish safety measurers
20	Loss of community properties	Control & Resettle	Compensate / Resettle
21	Loss of water supply pipes	Resettle	Resettle
22	Loss of religious properties	Compensation	Compensate the loss
23	Lose of crops	Compensate	Compensate the lose
24.	Loss of common/Public irrigation sources	Control/Resettle	Resettle or protect the sources.
25.	Lose of trees	Compensate & Control	Compensate the lose and plant equal number of trees in government lands.

26.	Lose of livelihood	Compensate	Paid appropriate compensation
27.	Involved in land acquisition process	Control	Ensure community participation in the whole process.
28.	Grievance	Control	Functional grievance redressal committee at village and district level.
29.	Restriction on the productive use of remaining land	Control	Include provisions in the compensation package.



1.13 . Detailed Mitigation Plan

Sl.No	Potential Impact	Positive/ Negative	Likeli Hood	Magnitude	Pre-Mitigation Level of Impact	Post-Mitigation Level of Impact
1	Loss of Residential House	Negative	Possible	High	High	Medium
2	Loss of Residential Building	Negative	Possible	Low	Medium	Low
3	Loss of Part of Residence	Negative	Possible	Moderate	Medium	Medium
4	Loss of Building	Negative	Possible	High	High	Medium
5	Loss of land	Negative	Possible	Moderate	Medium	Low
6	Lose of water bodies like well, pounds etc.	Negative	Possible	Low	Low	Low
7	Lose of structure	Negative	Possible	Low	Low	Low
8	Loss of part of structure	Negative	Possible	Moderate	High	Medium
9	Lose of existing access	Negative	Possible	Moderate	Medium	Low
10	Loss of employment	Negative	Possible	Low	Medium	Low
11	Loss of household wells	Negative	Possible	Low	Minimum	Low

11	Loss of household wells	Negative	Possible	Low	Minimum	Low
12	Loss of community tube well	Negative	Possible	Major	High	Medium
13	Loss of Parking areas	Negative	Possible	Major	Medium	Medium
14	Loss of access to properties	Negative	Possible	Moderate	Medium	Medium
15	Loss of access to sub roads	Negative	Possible	Moderate	Medium	Medium
16	Loss of House' Setback to canal	Negative	Possible	Major	Medium	Medium
17	Loss of cultural properties	Negative	Possible	Low	Minimu	Low
18	Loss of community properties	Negative	Possible	Low	Minimum	Low
19	Loss of water supply pipes	Negative	Possible	Major	High	Medium
20	Loss of religious properties	Negative	Possible	Low	Minimum	Low
21	Loss of Irrigation Canals	Negative	Possible	High	Medium	Low
22	Increased uneconomic holdings	Negative	Possible	Moderate	Medium	Low

23	Lose of cash crops	Negative	Possible	Moderate	Medium	Low
24	Lose of trees	Negative	Possible	Moderate	Medium	Low
25	Loss of Business	Negative	Possible	Major	Medium	Moderate
26	Grievance	Negative	Possible	Moderate	Medium	Low
27	Restriction on the productive use of remaining land.	Negative	Possible	Moderate	Moderate	Moderate
28	High land remaining	Negative	Possible	Moderate	Moderate	Low
29	Low land/water land remaining	Negative	Possible	Moderate	Moderate	Low



1.14 Assessment of Social Costs and Benefits

The Canals of Kochi city are the life line of city habitation even though now it used for the drainage purpose. The tide water flow still ensures a minimum level of inflow and out flow of water. Rejuvenation of Five major Canals of Kochi City is a long pending development project. Last two floods and its devastation upscale its importance. As roads and bridges were constructed more, road transportation eventually took over importance in Kochi. The canals soon turned waste drains due to several reasons. The town lacks conventional underground sewerage system and relies on primary kind of disposal mechanism i.e., septic tanks. About 83% of the households as per the Social Impact Study have septic tanks and other 15% leach pit type latrines. Majority of these septic tanks open through perforated/ disjointed pipes (below the ground level) for absorption into the soil. The high water table and monsoon season cause spillage/leaching from septic tanks and thus causing pollution of canals and groundwater.

The construction over canals are two types, one is major constructions like flyovers, bridges etc. second type is small culverts, walkway etc . The second type many a times reduces the water flow capacity of canals by way of reducing the canal width or blockage of smooth drain flow by flattered constructions.

Thirdly the decline of water transport also reduced movement within water and silting of the canals. Land encroachment near the canal area has also become more common. The Canals earlier are now turned into drainage due to waste dumping and also waste water discharge into the Canals. Along with these human activities, natural sedimentation of canals is also the major problems which have led to congestion of canals. The sediment carried by upstream rivers, gets accumulated and decreases the capacity of canals to flow water. This situation has created the huge threat of flooding as experienced in 2018 as well as 2019. Hence to let the canals rejuvenated with water flow and transportation canals needs to be developed and de-congested.

Since there are 301 families need to rehabilitate the impact of the project to rejuvenate the major Canals of Kochi city considered as major and necessary to prepare comprehensive rehabilitation and resettlement plan to mitigate the impact. 92% of the displaced residential houses are either squatter or encroacher. This increases the importance of prepared rehabilitation plan. Most of the displaced families are living in the project location since before the year 2000. Moreover most of the family members are having their livelihood in an around the project area. Therefore rehabilitation not far away from the project location may mitigate the impact. The project area is commercial in nature and the cost of land and living standards are increasing day by day. Therefore fixing compensation in consultation with people and local body leadership may mitigate the impact and minimize the grievance. The project may dismantle many constructions over canal like bridges, culverts, walkways etc. This may lead to years' long blockage of access to residential area. Foreseen measures and system for timely address the issues are needed to include in the detailed project implementation plan. A grievance redresses committee need to be set up in advance to start land acquisition process. This may build up people's confidence and help to reduce cases in court. It also help people to save time and resources to get justice.

The project partly affected several commercial structures and residence. But access to canal transport may marginally increase the commercial value of the buildings and it will mitigate the impact.

During the study many people complained about the encroachments. Identify the encroachments well before the starting of land acquisition may help encroachers to develop own plans for mitigate the impact.

The major livelihood activity in the Sea mouth and river mouth of canals are fishing and it's sorting or selling. The people involved in this livelihood are coming from the lower strata of population. They developed some structures and systems to harboring the boats and unload the fish and loading items for fishing. Resettling these traditional structures or installed advanced facilities will mitigate the impact.

Several venders are doing business in the banks of the Market Canal which is the major commercial canal of Kochi. Resettlement of these venders by getting opportunity to enjoy the developed canal facilities may mitigate the impact and ensure community participation.

Rejuvenating major canals of Kochi city is a major development initiative which develop the commercial and tourism potential of the city. There for develop special policy on Rehabilitation and Resettlement and land acquisition within the RTFCTLARR Act 2013 and rules thereafter may give scope to address area specific issues and it will help to mitigate the impact.

Several Colonies are situated within the COI. Developing a plan which protects the interest of these habitants may mitigate the impact.

The proposed project is one of the long due development initiative of the government. The water logging happened during the last two years flood made an attitudinal change in people's mind regarding the canal development. But absences of authentic communication regarding the project development, lot of confusion develop in the minds of people regarding the project and it gives scope for misleading information. Developing a system for regular communication and addressing the grievance may mitigate the impact an ensure community participation

CONCLUSION

In short the social impact assessment study conducted in the entire stretch of five major canals which are included in the canal rejuvenation project under IRUWTS finds that the overall social impact of the project is categorized as “major” and possible to mitigate it and able to reduce the impact as in the category of “low”. Analysis of the “Public Importance” of the project shows that in all indicators (ie Community support, People's benefit, Community ownership, Public Health importance, and Environment friendly and Economic opportunity) the project performed Excellent or Good or Above average. Research on the origin, existence and future importance of the proposed project is clear that no “alternative” possible. Therefore the project is socially feasible with a condition to incorporate comprehensive social impact mitigation measures in the Detailed Project Report

