Government of Kerala

INFRASTRUCTURE STATISTICS OF KERALA 2012-13

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Department Of Economics & Statistics Kerala

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P R E F A C E

In Kerala, the God's own country, the periodicity of generation of data on the suggested indicator is either annual or it depends on the frequency of related survey/records. Since the data corresponding to the year of review are not available, the latest figures of year under reference have been collected and consolidated to prepare this report. This report provides a single comprehensive source of infrastructure statistics for measure of transport, energy, communications and water infrastructure, Comprehensive and reliable statistics on the infrastructure sectors would play a prime role for the policy makers to determine infrastructure priorities, track progres on infrastructure development, benchmark performance against peers, and evaluate the impact of past investments. This report presents an overview of infrastructure statistics requirement of the State of Kerala.

This publication will help readers gain interesting insight in respect of the infrastructure statistics development for the State of Kerala.

I express my deep gratitude to all the data source agencies for their active co-operation, contribution and willing support extended without which it would have not been possible to this department to bring out the publication in time and in its present form.

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Suggestions, if any, to improve the quality, contents and presentation of this publication are most welcome.

THIRUVANANTHAPURAM **V .RAMACHANDRAN**

2-3-2015 **DIRECTOR GENERAL**

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1. Introduction

Infrastructure Development

Infrastructure is a key driver of economic growth and its development has the potential to fuel the economy. Creation and maintenance of physical infrastructure facilities is also a pre-requisite to attract foreign funds and boost the growth pace. Infrastructure is understood as an important input for industrial and overall economic development. However, without dependable statistics on the infrastructure sectors it is difficult for policy makers to determine infrastructure priorities, track progress on infrastructure development, benchmark performance against peers, and evaluate the impact of past investments. The need for comprehensive, comparable and reliable information on infrastructure is widely recognized. The key components of physical infrastructure viz.power, roads, railways, ports, airports and telecommunications were traditionally in the exclusive domain of the Government. An over view of some of the key infrastructure facilities in the State are indicated in the subsequent sections.

Extensive and efficient infrastructure is critical for ensuring the real functioning of the economy, as it is an important factor determining the location of economic activity and the kinds of activities or sectors that can develop in a particular economy. Poor infrastructure impedes a nation's economic growth and international competitiveness. It is a critical enabler for economic growth and contributes significantly to human development, and the attainment of the Millennium Development Goals (MDG).

Infrastructure Statistics - The Core Statistics

Infrastructure forms the foundation on which social, economic and Industrial Development is built. Kerala is among the well performing states in India and holds an important position in the industrial front. The state holds significant industrial potential owing to good infrastructure facilities like power, transport system, airports,

port and harbours and availability of rare materials. Central agencies like Railways, National Highways, Ports, Post and Telegraph, Telecommunication and Civil Aviation Authorities play a significant role in providing infrastructure facilities. Measuring infrastructure performance is required for decision making purposes to improve the availability and capacity of existing infrastructure and extend it in other directions as well. Therefore to create and manage good quality infrastructure, we need to have some measures of infrastructure. The infrastructure statistics are although available in dispersed manner, there is a need to compile these statistics in a consolidated and comprehensive way that can be useful for the policy makers and researchers. The productivity growth has been higher in countries with an adequate and efficient supply of infrastructure services. Provision of infrastructure services to meet the demands of business, households and other users is one of the major challenges of economic development. In an increasingly recognized world, availability of good quality infrastructure is a crucial factor in attracting foreign investments. Availability and accessibility of adequate infrastructure in a country on par with international community is an indicator of the presence of high quality of life. Some of the Infrastructure definitions used are detailed below.

- Road transport includes the administration of affairs concerning the operation, use, construction, and maintenance of road transport systems and facilities (roads, bridges, tunnels, parking facilities, bus terminals, and so on). It includes highways, urban and rural roads, streets, bicycle paths, and footpaths.
- Railway transport includes the administration of affairs and services concerning the operation, use, construction, or maintenance of railway transport systems and facilities (Railway roadbeds, terminals, tunnels, bridges, embankments, cuttings, and so on). It includes long-line and interurban railway transport systems; urban rapid transit railway systems, and other street railway transport systems; and the acquisition and maintenance of rolling stock.
- Maritime transport includes the administration of affairs and services concerning the operation, use, construction, and maintenance of inland, coastal, and ocean transport systems and facilities (harbors, docks,

navigation aids and equipment, canals, bridges, tunnels, channels, breakwaters, piers, wharves, terminals, and so on).

- Air transport includes the administration of affairs and services concerning the operation, use, construction, and maintenance of air transport systems and fcilities (airports, runways, terminals, hangars, navigation aids and equipment, air control amenities, and so on). It also includes radio and satellite navigation aids; emergency rescue services; scheduled and nonscheduled freight and passenger services; and the regulation and control of flying by private individuals.
- Availability of industrial infrastructure: Includes all the common facilities that are required to facilitate growth of industrialization in a region like industrial parks/ estates/ growth centers .
- Water supply includes the administration of water supply affairs, the assessment of future needs and the determination of available resources to meet those needs, and the supervision and regulation of all facets of portable water supply including water purity, price, and quality controls.
- Sanitation (wastewater management) includes the administration, supervision, inspection, operation, and support of sewerage systems and wastewater treatment; Electricity (power) covers both traditional sources of electricity such as thermal or hydropower supplies and newer sources such as wind or solar; the administration of electricity affairs and services; the construction, development, and rationalized exploitation of electricity supplies; and the supervision and regulation of the generation, transmission, and distribution of electricity;

Infrastructure Statistics Of Kerala - An Overview

Statistics related to infrastructure are important in determining the availability of inputs that are crucial to a wide variety of productive activities. There may be divergence of opinion whether infrastructure should be created inresponse to demand or in anticipation of demand. There is no denying, however, that its non-availability will act as a severe constraint on the productive capacities of the economy. Statistics relating to various types of infrastructure as well as its

geographic distribution will be important for policy and planning purposes, as well as in guiding investment decisions. Data relating to infrastructure should be complete, accurate and up to date.

Composition of Infrastructure Sector

(a) Construction
(b) Electricity generation, transmission and distribution
(c) Gas generation and distribution through pipes
(d) Water works and supply
(e) Non-conventional energy generation and distribution
(f) Railway tracks, signalling system and stations
(g) Roads and bridges, runaways and other airport facilities
(h) Telephone lines and telecommunications network
(i) Pipelines for water, crude oil, slurry, etc.
(j) Waterways
(k) Port facilities
(l) Canal networks for irrigation
(m) Sanitation and sewerage
Based on these parameters, six sectors have been identified as infrastructure

These are:

i. Transport
ii. Communication
iii. Energy
iv. Drinking water supply and sanitation
v. Irrigation
vi. Storage
vii. Sanitation Sewerage

Section A: Transport Infrastructure

Transport infrastructure facilitates the transportation of people and goods and provides them access to markets, employment and investment opportunities. Transport infrastructure is thus an essential component of the economy. An efficient transportation system can have a multiplier effect on the economy whereas a deficient transportation system can result in economic loss. For efficient transport system, an adequate infrastructure is very important. With growing population there is a need to provide matching transport infrastructure to avoid overcrowding, overloading and poor maintenance of the available infrastructure.

Transportation can be provided by various modes depending on the surface over which one has to travel – land (road, rail, and pipelines), water (shipping) and air. Road transportation: Road transportation is a large consumer of space and has high maintenance costs, both for vehicles and infrastructures. Rail transportation: Although expensive to build rail transportation provides movement of people and heavy loads to long distances. Heavy industries are linked by Rail transportation. Maritime transportation: Maritime transportation is the most effective mode to move large quantities of cargo over long distances.

Air transportation: Air transportation has unlimited routes but are constrained by site for landing and takeoff of planes, climate, fog and aerial currents. Air transportation is especially useful in long distance mobility of people and has been one of the most important factors in the globalisation.

For compilation of infrastructure statistics, transport sector has been divided into four sub sectors viz. Roads, Railways, Airways and Inland Waterways, Sea & Coastal Transport.

Section B: Communication Infrastructure

Communication is an important part of economic development. It facilitates exchange of commercial activities and integrates the nation economically and socially. Communication system connects a place to rest of the world and provides facilities to trade both nationally and internationally. Telecommunication and posts are the two main constituents of communication system.

Postal communication: Postal communication system had been the main method of communication in India for nearly a century and half. It is viewed as the most dependable means of written communication. Postal services have provided other services as well in addition to delivery of letters. These are:

- Delivery of letter and other mail
- Savings Bank operations
- Money transfer
- Provision of Life Insurance

It is used as the most reliable means of sending money through money orders and for delivering articles of value. The banking services provided by Post Offices attract a large number of people both from rural and urban areas due to easy accessibility and wide network of post offices.

Telecommunication: Telecommunication is one of the prime support services needed for rapid growth and modernization of various sectors of the economy. Telecommunication has helped to build global business empires. Information tools such as telephones, personal computers and the internet are increasingly critical to economic success and personal advancement. All these help to encourage economic growth. Furthermore, a reliable telecommunications network can improve the productivity and efficiency of other sectors of the economy and enhance the quality of life.

Section C: Energy Infrastructure

Energy is an important factor of economic development of a nation as it is required to meet the demands of industry, commerce and domestic users. Growing economies like India need to have stable and sustainable sources of energy supply as it is an important input in the production process. Indirectly, it also affects the health and education system of the country. Affordable energy directly contributes to reducing poverty, increasing productivity and improving quality of life. An efficient energy system provides better opportunities for industries and production processes. The most visible form of energy, which is often identified with progress in modern civilization, is power, commonly called electricity. It is a critical component of infrastructure that determines the economic development of a country. To increase

the availability of electricity, Kerala has adopted thermal and hydel resources. In addition to that, Kerala state is endowed with a number of mineral deposits and hence mining has its own significance.

Section D: Irrigation Infrastructure

Irrigation is an essential component of agriculture in India as the rains occur only for three to four months. During rest of the year irrigation is the only source of water for agriculture. Access to good irrigation allows people to increase their productivity. They can also diversify to other crops. Irrigation reduces the vulnerability of farmers to unpredicted rains and other external shocks, thus enhancing their chances of higher productivity and better incomes. Availability of irrigation facilities encourage farmers to switch from low value subsistence production to high valued market oriented production. They can substitute low yielding crops with high yielding and more profitable crops. Irrigation through canals, wells and other sources is considered as a catalyst of economic development of a country.

Section E: Storage Infrastructure

Storage of goods is of vital importance not only in the agriculture sector but also in the industrial sector. In the primary sector that is agriculture, storage is necessary at the farm and fields level; in the secondary sector that is industry, storage is essential at the processing and manufacturing level and in the tertiary level it is inevitable for the domestic, import and export trade. The necessity for storage arises primarily because of lack of adjustment between the time and place of production of goods and time and place of their consumption. Warehouses play a vital role in the flow of goods from producers to consumers. It helps in combating annual and seasonal fluctuation in production and prices. Provision of facilities for food grains comes under the purview of Department of Food and Public Distribution.

It has been felt that infrastructure being the backbone of all productive processes; the statistics on this sector would become a necessity sooner or later.The

detailed classification of infrastructure statistics, relevant definitions for each sub sector and available data are described in the following sections.

Section F: Water Supply And Sanitation Infrastructure

Water is a precious natural resource. Our connection to this invaluable resource is clear, without water a person could die of dehydration in a matter of days, even hours. But it is its scarcity which is the cause of concern in today's time. It is the most basic need to sustain all forms of life on earth. Yet its denied access is the problem with which the world is grappling with. Directly or indirectly, it affects the economic position of the country and hence an important barometer of a country's condition. Lack of improved sanitation facilities and unsafe drinking water sources kills and sickens thousands of children every day and leads to impoverished and diminished opportunities for thousand's more. Poor sanitation, water and hygiene have many other serious repercussions. Women are forced to spend large part of day fetching water, poor farmers and wage earners are less productive due to illness. And hence national economies are ultimate sufferers. Without WASH (water, sanitation and hygiene) sustainable development is impossible.

2. TRANSPORT

Connectivity like energy has a strong bearing on the development of different sectors of the economy. Connectivity and overall development has strong correlations through variety of linkages. First, the development of this infrastructure, especially rural one, has far reaching implications for poverty reduction by improving income-generating opportunities. Second, it raises agricultural production through diffusion of technology and corresponding reduction in prices, and thirdly the connectivity is essential ramification for tourism sector. As such, efficient transport and communication system are the lifelines of National economy. A dense and efficient network of connectivity and communication is the pre-requisite for local, National and Global trade of today.

Transport sector plays a pivotal role in the overall development of the country which enables social and culture and trade development between countries. Transport infrastructure is the backbone of a nation's economy Transport infrastructure facilitates the transportation of people and goods and provides them access to markets, employment and investment opportunities. An efficient transportation system can have a multiplier effect on the economy whereas a deficient transportation system can result in economic loss. For efficient transport system, an adequate infrastructure is very important. With growing population there is a need to provide matching transport infrastructure to avoid overcrowding, overloading and poor maintenance of the available infrastructure.

Transport infrastructure consists of fixed installation such as roads, railways, airways, canals, pipelines and terminals. Kerala had over the years developed a good infrastructure. For compilation of infrastructure statistics, transport sector has been divided into four sub sectors viz. Roads, Railways, Inland Waterways, Sea & Coastal Transport and Airways. The major development indicators of Transport and Communication sector in the State from 2011 to 2013 are given in Table 1.2

Road Transport

The socio-economic development of an area is directly linked to a better communication network particularly the road connectivity in that area. Of the various modes of transport, Road Transport is vital to economic development, trade and social upgradation. Road transportation is the large consumer of space and has high maintenance costs, both for vehicles and infrastructures. They are mainly linked to light industries where small batches of freight are required to be transported. They are useful for everyday movement of people to their workplaces or to meet everyday needs. For efficient road transportation we need good quality roads with proper signage and traffic regulation.Almost all the urban centres in the State are nodal points in road network., The different categories of roads are Rural roads, Urban roads, project roads Highways, National Highway, State Highway,Muncipal roads,Railway roads, Major port roads, Others. There are 9 National Highways in the state- NH 66, NH 966A ,NH 966B ,NH 85, NH 544, NH 744, NH 766, NH 966 and NH183.The National Higway network is of length 1618.240 Kms.

KSRTC is the largest single Public sector undertaking, which carries out transport operations in the State. Road transport acts as the feeder service to the rail, air and Inland water transport. The vehicle density of the state is very high compared to many other states in India. The tremendous increase in the volume of road traffic in recent years has caused increase of road accidents. Government of Kerala and police have taken several initiatives to enforce road discipline and rules and programmes to address the alarming issues of increasing road accidents by coordinating all stakeholders.

The State road includes 4341.651 Kms. of State Highways and 27470.455 of Major District Roads.

2.1 Length of roads in Kerala (in kms) 2012 - 2013

Sl. No.	Type of roads	31-03-2012	31-03-2013
1.	State Highways	4341.651	4341.651
2.	Major District Roads	27470.455	27470.455
3.	Other District Roads	0	0
4.	Village Roads	0	0
	Total	**31812.106**	**31812.106**

Source: PWD Roads & Bridges Wing

2.2 Growth of Transport & Communication System in Kerala 2011 -12 & 2012 -13

Sl. No	Item	Unit	2011	2012	2013
1	Road Length(PWD)	Km	23241.709	31811.601	31811.601
2	Motor Vehicles	No	6072019	6870354	8048673
3	Buses ownwd by KSRTC	No	5741	5803	5812
4	Railway Route Length	Km	1257	1257	1257
5	Flights operated(both domestic and International)	No	73208	82010	66122
6	Boats/Jhankars operated by SWTD	No	92	95	95
7	Route Distance by SWTD	Km	6890	6890	6890
8	Post Offices	No	5067	5068	5064
9	Telephone Exchanges	No	1245	1245	1266
10	Public Call Offices	No	95193	95193	95193

Source: Economic Review

Analysing the PWD roads it reveals that only 6.655 Km is cement concrete, 30744.39 5Km is black topped and 447.238 Km water bound macadam. The black topped surface contributes 96.6 percentages.

2.3 Details of roads (in km) maintained by P.W.D

2011-12 & 2012 – 2013 (In Kms)

Type of Road	31-03-2012	31-03-2013
Cement Concrete	6.655	6.655
Black Topped	30744.395	30744.395
Water Bound Mecadam	447.238	447.238
Others	613.313	613.313
Total	**31811.601**	**31811.601**

Source: Economic Review

2.4 Details of National Highways with State Public Works Departments 2012-13

District	NH No		Chainage		Length in Km	Total length
	Existing	New	From	To		
Kasaragod	NH17	NH66	18.050	104.000	85.950	85.950
Kannur	NH17	NH66	104.00	184.600	80.600	80.600
Mahi	NH17	NH66	184.600	186.105	1.505	1.505
Wayanad	NH 212	NH766	57.00	117.600	60.600	60.600
Kozhikode	NH17	NH66	186.105	263.444	77.339	157.339
	NH212	NH766	0.00	57.000	57.000	
	NH17calicut Bypass	NH 66	5.100	28.100	23.000	
Malappuram	NH17	NH66	263.444	349.600	86.156	157.500
	NH213	NH966	15.656	87.000	71.344	
Thrissur	NH17	NH66	349.600	413.000	63.400	155.4
	NH47	NH544	250.000	342.000	92.000	
Ernakulam	NH17	NH66	413.000	438.827	25.827	131.487
	NH47	NH66	342.000	358.760	16.760	
	NH47C	NH966A	0.000	17.000	17.000	
	NH47A	NH966B	0.000	5.900	5.900	
	NH49	NH85	220.610	286.610	66.000	
Palakkad	NH47	NH544	182.000	250.000	68.000	121.96
	NH213	NH966	87.000	140.960	53.960	
Idukki	NH49	NH85	119.017	220.610	101.593	157.343
	NH220	NH183	159.850	215.600	55.750	
Kottayam	NH220	NH183	62.000	159.850	97.850	97.850
Alappuzha	NH47	NH66	358.760	462.000	103.240	103.240
Kollam	NH47	NH66	462.000	520.400	58.400	206.200
	NH208	NH744	0.000	81.250	81.250	
	NH220	NH183	0.000	62.000	62.000	
	NH47Kollam	NH66	8.450	13.000	4.550	
Thiruvananthapuram	NH47	NH66	520.400	599.000	78.600	101.266
	NH47 TVPM bypass	NH66	0.000	22.666	22.666	
Total						**1618.240**

Source: PWD, National Highways

2.5 Abstract of Bridge Register 2012-13

Sl. No	Division	Minor Bridges			Major Bridges			No of Minor Bridges (more than 6m & less than 60m length)(2+3+4)	No of Major Bridges (more than 60m length)(5+6+7)	Grand Total (8+9)
		Good	Bad	Reconsn required	Good	Bad	Reconsn required			
	1	2	3	4	5	6	7	8	9	10
1	Thiruvananthapuram	56	23	1	10	0	0	80	10	90
2	Kollam	91	10	0	19	0	0	101	19	120
3	Alappuzha	106	26	2	19	2	0	134	21	155
4	Pathanamthitta	52	0	0	11	0	0	52	11	63
5	Kottayam	167	16	4	19	3	0	187	22	209
6	Idukki	67	23	1	11	0	0	91	11	102
7	Muvattupuzha	103	7	0	13	1	1	110	15	125
8	Ernakulam	28	8	2	19	4	1	38	24	62
9	Thrissur	108	7	4	15	1	1	119	17	136
10	Palakkad	78	8	25	25	1	5	111	31	142
11	Manjeri	19	5	0	30	1	1	24	32	56
12	Kozhikode	45	12	6	18	0	0	63	18	81
13	Vadakara Churam	6	1	0	0	0	0	7	0	7
14	Wayanad	28	19	6	4	0	0	53	4	57
15	Kannur	85	12	7	29	6	0	104	37	141
16	Kasaragode	36	3	0	24	4	2	39	28	67
	Total	**1075**	**180**	**58**	**266**	**23**	**11**	**1313**	**300**	**1613**

Source: Roads & Bridges

Motor Vehicles Department

Motor Vehicles Department is one of the major revenue earning departments of the Kerala State. Towards the administration and enforcement of Motor Vehicle Laws, Collection of tax on Motor Vehicles under various categories, registration of vehicles, licensing of drivers and regulation of use of motor vehicles in the State in accordance with the powers conferred on the Department and has achieved remarkable achievements. The number of motor vehicles having valid registration as on 31.3.2012 and 31.03.2013 are 6870354 and 8048673 respectively. The District wise and category wise details of motor vehicles having valid registration for the year 2012 - 13 is given in Table.1.8. The number of newly registered vehicles for the year 2012-13 is 8048673. In Kerala, Idukki has the lowest registered vehicles followed by Kannur.The highest vehicle population is registered in Ernakulam district followed by Thiruvananthapuram .The category wise growth of Motor vehicles in Kerala from 2012 to 2013 is given in the Table1.6

Trends of Road Accidents in Kerala

Tremendous increase in the volume of road traffic in recent years has caused increase of road accidents. As vehicle population increases road accidents also increases. It is also observed that 97.7 percent of the accidents occurred due to the rash driving of motor vehicles. Category wise details of Motor vehicle involved in road accidents are given in Table1.9.

2.6 Category-wise Growth of Motor vehicles in Kerala 2011 -12 & 2012 - 13

Sl No	Type of vehicles	2011-12	2012-13
1	**Goods Vehicles**		
	Four wheelers and above	322450	354296
	Three wheelers including tempos	128452	206901
2	**Buses**		
	Stage carriages	26272	34161
	Contract carriages/ Omni buses	124290	137731
3	**Cars And Station Wagons**		
	Cars	1226691	1358728
	Station wagons		
	Taxi Cars	175638	128250
	Jeeps	73700	74167
4	**Three Wheelers**		
	Auto rickshaws	575763	602547
	Cycle Rickshaws	0	0
5	**Two Wheelers**		
	Motorised cycles	0	0
	Scooters/ Motor cycles	4127227	5041495
	Tractors	13740	14183
	Tillers	5399	5399
	Trailors	2407	2744
	Others	68325	88071
	Total	**6870354**	**8048673**

Source: Transport Commissionrate

2.7 Vehicles Registered in Kerala 2011-12 & 2012-13

Sl .No	Type of Vehicle	31.03.2012	31.03.2013
1.	**Goods Vehicles**		
	Four wheelers and above	322450	**354296**
	Three wheelers including tempos	128452	**206901**
2.	**Buses**		
	Stage carriages	26272	**34161**
	Contract carriages/ Omni buses	124290	**137731**
3.	**Four wheelers**		
	Cars	1226691	**1358728**
	Station wagons	175638	**128250**
	Taxi Cars	73700	**74167**
4.	Jeeps		
	Auto rickshaws	575763	**602547**
	Cycle Rickshaws	0	**0**
5.	**Two wheelers**		
	Motorised cycles	4127227	5041495
6.	Scooters/ Motor cycles		
	Tractors	13740	14183
	Tillers	5399	5399
	Trailors	2407	2744
	Others	68325	88071
	TOTAL	**6870354**	**8048673**

Source: Economic Review

2.8 Number of Motor vehicles having valid registration 2012-13

District	Goods Vehicle		Buses		Four Whelers			Three Wheelers		Two Wheelers		Tractors/Trailors				Total
	Four Wheelers &above	Three wheelers including tempos	Stage Carriages	Contract Carriages/ Omni buses	Cars	Taxis	Jeeps	Auto rickshaws	Motorised cycle rickshaws	Motorised cycles	scooter /Motor cycles	Tractors/ Trailors	Tillers	Trailers	Others	
Thiruvanantha-puram	28335	13188	6243	18940	186545	17218	7172	55848	0	0	620457	450	119	146	16443	971104
llam	22469	9601	837	8082	110728	9315	4879	52076	0	0	376896	546	260	336	4017	600042
thanamthitta	12756	5839	1026	5253	75854	2202	3480	23094	0	0	182652	264	52	292	1904	314668
ppuzha	22752	11704	937	7134	78103	12968	716	23946	0	0	370533	1074	130	282	1661	531940
ttayam	26326	8026	1681	12509	126965	17143	11130	51489	0	0	290775	755	124	63	4531	551517
kki	8875	2700	912	2480	26840	3440	5367	22802	0	0	66074	257	139	18	1593	141497
nakulam	66221	17963	3235	21407	233988	25305	2124	61994	0	0	777462	1487	1301	156	25397	1238040
rissur	32474	15114	2049	17760	117291	20591	4432	54292	0	0	493789	1136	473	625	3475	763501
lakkad	22599	12851	1666	10094	51048	8237	3739	42361	0	0	507358	4786	969	121	4632	670461
lappuram	32665	76847	3189	19364	102604	1200	9758	82634	0	0	351899	1354	724	314	5639	688191
zhikode	29084	12653	2517	5613	105207	1533	8003	51283	0	0	345527	370	158	82	8237	570267
yanad	4961	2757	422	1385	15785	1749	3878	12365	0	0	379827	174	258	142	2311	426014
nnur	35010	15195	2715	6702	82763	4480	6125	42894	0	0	76427	1397	284	99	5935	280026
sargode	9769	2463	600	1008	45007	2869	3364	25469	0	0	201819	133	408	68	2296	295273
	0	0	6132	0	0	0	0	0	0	0	0	0	0	0	0	6132
TOTAL	**354296**	**206901**	**34161**	**137731**	**1358728**	**128250**	**74167**	**602547**	**0**	**0**	**5041495**	**14183**	**5399**	**2744**	**88071**	**8048673**

2.9 Category wise details of Motor Vehicles involved in Road Accidents for the year 2011-12 & 2012-13

Sl No	Type of Vehicles	2012	2013
1.	KSRTC Buses	1312	869
2.	Other Buses	3470	2385
3.	Goods Vehicles	-	-
4.	Motor cars	9063	6760
5.	Jeeps	1043	661
6.	Auto rickshaw	5753	4063
7.	Two wheelers	17116	13003
8.	Miscellaneous Vehicle	-	-
9.	Class not known	1878	1545
	Total	**39635**	**29286**

Source: Transport commissionerate

2.10 Infrastructure Details 2011-12 & 2012-13

Items	years	
Vehicles	**2011-12**	**2012-13**
Registered During the year	596054	1156867
Upto the year	6668073	8048673

Revenue Collection		
	2011-12	**2012-13**
Fee(Rs)	1957355298	2478374293
Tax(Rs)	13051815149	15810578091
Other(Rs)	8600	4022054
Total(Rs)	**15009179047**	**18292974438**

Expenditure		
	2011-12	**2012-13**
Direction & Admn.(2041-00-001-99)	34366875	337591857
Inspection of vehicles(2041-00-102-99)	185737097	218906424
Road Safty Measures(2041-800-99)	0	145048
Total	**220103972**	**556643329**

Offices & Staff		
	2011-12	**2012-13**
Transport Commissioner Office		1
Deputy Transport Commissioner Office		4
Regional Transport Office	18	18
Sub Regional Transport Office	47	55
Check post	17	17
Staff Strength	**1887**	**2293**

Road Crash		
Cases Reported	34921	35215
Injury	39977	40346
Death	4145	4258

Source: Transport Commissionrate

Water Transport

Kerala Port sector

The Kerala State lies in the southwest corner of the Indian peninsula. It has a coastal length of 585 km and the state has an average width of about 60 km with one major port at Cochin and 11 non major ports. The non-major ports are under the administration of Government of Kerala. The Non majorports are Kasaragod, Azhikkal, Kannur, Thalassery, Kozhikode, Ponnani, Kodungalloor, Alappuzha, Kollam, Trivandrum, Vizhinjam.

Cochin Port

Cochin port is the only major port in Kerala and is the major gateway to the State. Cochin Port is a major port on the Arabian Sea - Indian Ocean sea-route and is one of the largest ports in India. The port lies on two islands in the Lake of Kochi namely the Willingdon Island and Vallarpadam, towards the Fort Kochi river-mouth opening onto the Arabian Sea. The Vallarpadam International Container Trans-shipment Terminal (ICTT), a part of the Cochin Port, is the largest container trans-shipment facility in India.

The port is governed by the Cochin Port Trust, an establishment of the Government of India. The modern port was established in 1926.The Cochin Port is one among a line of maritime-related facilities based in the port-city of Kochi, the others being, the Cochin Shipyard, the largest ship-building as well as maintenance facility in India, the SPM (Single Point Mooring facility) of the Kochi Refineries - an offshore crude carrier mooring facility, and the Kochi Marina.

Operational Efficiency

24 Hour Pilotage

24 hour Cargo Operations

Real-Time co-ordination of vessel movement through VTMS

Single Window Transaction

Moving towards Zero Pre-Berthing Detention Time.

2.11 Category Wise Distribution Of Vessels Entered The Port 2011-12 & 2012-13

Year	No. of vessels carrying							Sailing vessels	Total	NRT
	Containers	Coal	Fertilizers & raw materials	Food grains	General Cargo	Tankers	Others			
2011-12					100		1234.50	422	1756.5 00	366694.17
2012-13					120	0	103	324	547	301045.22

Source: www.cochinport.com

2.12 Distribution of Cargo Traffic for the year 2012-13

(In'000 tonnes)

Sl.No	Category	Imports	Exports	Total
1	Soda Ash	346		346
2	Oil cake	1296		1296
3	Timber logs			
4	Others	22794	63446	86240
	Total	24436	63446	87882
5	Rock Phosphate			
6	Sulphur			
7	Zinc Concentrate			
8	Coal			
9	Murate of Potash			
10	Shredded Scrap			
11	Others	60		60
	Total	60		60
12	POL		6224	6224
13	Others		216	216
	Total		6440	6440
14	Containers (000' Tonnes)	4		4
	(TEUs)	24496		
	Total	**4**		**4**
	GRAND TOTAL	**24500**	**69886**	**94386**

Source: www.cochinport.com

2.13(a) Performance Details 2012-13

PARAMETER	PERFORMANCE (2012-2013)
Average pre-berthing detention of vessels on Port account (in hours)	
Liquid bulk	Nil
Dry bulk	5 days
Break bulk	Nil
Container	Nil
Overall	5 days
Average turn-around time of vessels (including detention on Port account) in days	
Liquid bulk	Nil
Dry bulk	12 days
Break bulk	2 days
Containers	2 days
Overall	14 days
Average ship berth day output (in tonnes)	
Liquid bulk	51.4
Dry bulk	243
Break bulk	
Containers	
Overall	
Total Volume of Cargo (Major commodity-wise, in 000 Tonnes)	
POL	6224
Fertilizers	243
Fertilizer Raw Materials	
Coal	
Containers (TEUs)	
Others	88121.00541
TOTAL	**94588.00541**

Source: www.cochinport.com

2.13(b) Non- Major ports Cargo handled at Non-Major ports

2011-12 &2012-13

Year	Non Major Ports (in Tonnes)
2012	86649
2013	80784

Source: Department of Ports

2.14 Outlay and Expenditure at Non Major Ports

2010-11 ,2011-12 & 2012-13

Year	Non Major Ports (in Lakhs)			
	Non Plan		Plan	
	Budget Outlay	Expenditure	Budget Outlay	Expenditure
2011	1065.96000	749.74697	21680.00000	21435.90550
2012	31037.48000	677.90018	26773.80000	26284.17165
2013	1092.67000	709.04880	16395.30000	14446.85162

Source: Department of ports

2.15 Imports & Export for the year 2011-12 & 2012-13

Year	Non Major Ports (in Tonnes)
2012	**103367.41**
2013	**95729**

Source: Department of Ports

2.16 Commodity wise analysis of Exports

2011-12 & 2012-13

Year	Ores & Minerals (In Tonnes)	Manufactured Goods (in Tonnes)	Total (in Tonnes)
2012	**7529.41**	**79120**	**86649.41**
2013	**9745**	**71039**	**80784**

Source: Department of Ports

Inland Water Transport in Kerala

Inland water transport is a fuel efficient and environment friendly mode of transportation. Kerala is a land with abundant water bodies. Backwater is a wonderful gift of nature to the God's Own Country, where waterways are successfully used for commercial inland Water Transport. Ashtamudy and Vembanadu lake which completes the network of waterways not only provides natural beauty but inland navigation facilities also. This Inland Water Transport system consists of 1895 kms of waterways. This includes navigable river, backwaters and man made cross canals. Most of these are in Travancore-Cochin region. Of the 44 rivers in Kerala, the 41 west flowing rivers together with backwaters and man made canals form the integral part of inland navigation system.

The Government agencies engaged in the development of Inland Water Transport in the State are Coastal Shipping and Inland Navigation Department (CSIND), State Water Transport Department (SWTD) and Kerala Shipping and Inland Navigation Corporation Ltd (KSINC)

Kerala State Water Transport Department (SWTD)

State Water Transport Department is a governmental agency who provides inland water transport facilities to the people residing in the water logged areas of the districts of Alappuzha, Kottayam, Kollam, Ernakulam, Kannur and Kasargode and to enjoy the everlasting memory of backwaters.

The Kerala State Water Transport Department formed during 1968 with its Head Quarters (Directorate) in the district of Alappuzha. The objective of the department was to provide transport facilities and cargo transportation to the people residing in the water logged areas at cheaper rates. Construction of roads, bridges and roadways shortened the operation of the department to passenger transport only, providing backwater transport through ferries. The system is free of pollution, accidents, and is affordable. But in the world of speed and hurry the advantage of this pollution free, accident free and cheaper transport system beckons least preferences. The government has now mooted setting up Kerala State Boat Jetty

Corporation with a vision to convert the boat jetties in Kerala to world class standards. This corporation will enhance and develop the boat jetties into commercial assets for the state. Some jetties were identified for development like Kaavalam jetty and Kumarakam jetty. Jetty based shopping centers and cafeterias are sources of huge returns. The system provides on average 79,000 km of service to 80,000 people through its 13 stations and 81 boats daily. Even though, it is a commercial department; its functioning is like a service Department, ever since 'Transportation' came under "Essential Service" in Kerala. The Department transports about 150 lakhs of passengers per annum using Wooden/Steel and fibre glass passenger boats

Major areas of operation: -

Backwaters

(1) Vembanattu lake - 52 sq kms.
(2) Ashtamudy lake - 200 sq kms.
(3) Ernakulam - Vypeen ferry (Cochin port & Harbour)
(4) Muhamma - Kumarakom
(5) Vaikom - Thavanakkadavu
(6) Payyannur - Parassinikkadavu

Total distance operated - 79,000 km per day
No. of passengers carried - 80,000 per day
No. of operating centers - 14 stations

District	Station
Ernakulam	Ernakulam Station Office
Alappuzha	Alappuzha, Nedumudy, Kavalam, Pulincunnu, Edathua, Muhamma and Panavally Stations
Kottayam	Kottayam, Changanachery and Vaikom stations
Kollam	Kollam Station
Kannur	Payyannur and Parassinikkadavu stations

Longest route operated. - 60.km

Capacity of boats - 50 passenger to 150 passengers (wooden boats) Boats are constructed in the traditional way with well seasoned teak wood.

Speed of boat. - 10 to 15 km per hour,

Size of boats Length - 20 mtr to 35 mtrs,

Width - 3 to 4.5 meters,

Depth - 2 mtrs,

Weight - 5 to 15 tonnes.

No. of crew for a boat - 5 persons at a time

Boat Capacity - 50 to 150 passengers (wooden boats)

Services: - Operates 81 boats**.**

Now roads and bridges have come into existence in many of these Water logged areas, and passengers have the alternative to reach their destinations through road. In spite of all these developments of the vehicles transport, the water transport facility extended by this department still maintains its significance. Water transport is safe, economical & pollution free, compared to any other mode of transport. The vision of the department is to decongest the Road Transport by introducing large-scale cargo movements through the waterways of the state interconnecting several districts.

2.17 Details of State Water Transport Department 2011-12 & 2012-13

		2011-12	2012-13
1	Total No of Boats	95	95
2	Passenger Boats	92	92
3	Pilot Boat	1	1
4	Workshop-cum- Ambulance Boat	1	1
5	Speed Launch	1	1
6	No. of schedules	49	50
7	No. of Trips per day	733	740
8	Cross Route Distance per day in kms	6900 Kms	7040 Kms
9	Distance operated per day	6555 Kms	6695 Kms
10	No. of passengers carried	162.48 Lakhs	163.94 Lakhs
11	Total Revenue Receipts	5.21 Crores	5.43 Crores
12	Total Revenue Expenditure	31.528 Crores	32.171 Crores
13	Collection per km	26 /-	27 /-
14	Cumulative loss	215.34 Crores	217.16 *-Crores
15	Expenditure per km	140 / km	142 / km
16	Percentage of Cancellation	5.30 %	5.00 %
17	Diesel Consumption per day	5201 Ltrs	5297 Ltrs
18	Collection per day	Rs 1,42,738/-	Rs 1,48,738/-
19	Expenditure per day	Rs 8,63,786/-	Rs 8,81,397/-

Source: State Water Transport Department

Railways in Kerala

Railways are the principal mode of transportation in the country. Railways bind the economic life of the country as well as accelerate the industrial and agricultural development of the nation. Well laid rail network is definitely the sign of industrial growth. A well advanced rail network makes the supply of raw material, labour and other requirements like marketing of the products possible and smooth. Moreover, Railways remained the largest employment provider for the huge population of the country. Rail transport began in Kerala at Malabar. On March 12, 1861, Kerala's first train, built by the Madras Railway Company, chugged along the Beppur - Tirur line (30.6km). Construction of a railway line started in Kochi province in 1889. In 1902, the Madras Railway Company completed work on a narrow gauge railway-line that connected Shornur and Eranakulum (106.06 km). The line was converted into broad gauge between 1930 and 1935 as part of developments of Cochin Port.

Train service began in Travancore on November 26, 1904, with the completion of the Chengotta -Punalur meter gauge line. On November 4, 1931, the Thiruvananthapuram Central Railway Station was launched. In 1956 during the formation of Kerala, the total length of railway line in the State was 745 km. Eranakulam and Kollam were not connected by rail then. The Eranakulam -Kottayam and Kottayam -Kollam railway lines were completed in 1956 and 1958 respectively. In December 1971, a Rs. 13.59 –crore projects to convert the Thiruvananthapuram - Eranakulam line (220 km) from metre gauge to broad gauge was sanctioned. The work was completed in 1976 .The Railways opened the Thiruvananthapuram - Kanyakumari broad gague line (31 km in Kerala) in 1979. The Eranakulam - Alappuzha broad gague line and the Alappuzha -Kanyakumari line (943 km) were completed in 1989 and 1992 respectively. The Madras -Ernakulam (via Shoranur; 180 km in Kerala) stretch got a double track in 1986. The Thrissur -Guruvayur broad gague line (21 km) was laid in 1994. The Kayamkulam -Kollam (41 km) and Kollam – Thiruvananthapuram (65 km) stretch got double tracks in 1996 and 2000 respectively. Doubling of Shornur -Mangalapuram line (313 km) is in progress. The Thrissur -Eranakulam line was electrified in 2002. The Southern Railway, headquartered in Chennai, Controls rail transport in Kerala. Southern Railway, in its

present form, came into existence on 14th April 1951 through the merger of the three state railways namely Madras and Southern Mahratta Railway, the South Indian Railway, and the Mysore state railway. Southern Railway's present network extends over a large area of India's Southern Peninsula, covering the states of Tamilnadu, Kerala, Pondicherry, and a small portion of Andhra Pradesh. Serving these naturally plentiful and culturally rich southern states, the SR extends from Mangalore on the west coast and Kanyakumari in the south to Renigunta in the North West and Gudur in the North East.

The Southern Railway comprises of the following six divisions.

1. Chennai
2. Tiruchirappalli
3. Madurai
4. Palakkad
5. Trivandrum
6. Salem

Kerala is bestowed with a railway route length of 1257 kms. The total length of railway line under the Thriruvananthapuram division is 488.60 km and that under Palakkad division 549 kms.

2.18 Length of Rail under Palakkad Division-2013

Route Km			Total Track Km
Broad Gauge	Meter Gauge	Total	
1033.46	87.38	1120.84	1120.84

Source: www.irtsa.net/forums/thread-1173-lastpost.html

Facility of Unreserved Ticketing System has been provided at 71 Railway stations over Trivandrum division. All railway stations except train halts (minor stations operated by contracters) have been provided with this facility.

Passenger Reservation system tickets can be purchased from 41 railway stations, 25 Non-rail head locations and from 8 post offices (*No V/C 518/UTS/ PRS/14*).

Railway lines of Kerala are mostly situated near to coastline, running in North-South direction. Thiruvananthapuram division has 407 level crossings; of which 296 are manned and 111 are unmanned. Unmanned level crossings are main cause of

concern with regard to safety of users. The number of deaths in railway level crossings in Kerala that had been declining has of late started increasing, clearly stating the negligence of the people. It is seen that 91 percent of level crossing accidents take place during daytime. It is mainly due to the fact that during night, track volume on roads is quite low. The propensity of accidents at level crossing is measured by multiplying daily traffic volume and train volume passing through a level crossing.

2.19 No of Level Crossing under Palakkad Division 2012-13

Manned Level Crossing	Unmanned Level Crossing	Total
138	Nil	138

2.20 Reservation System in Palakkad Division 2011-12 & 2012-13

Systems	2011-12	2012-13
No: of Passenger Reservation System	22	32
No: of Unreserved Ticketing Sysem	60	60
No. of Integrted Unreserved ticketing system cum Passeng Reservation System	20	20

2.21 Average no: of Trains & Passengers running under Palakkad Division 2011-12 & 2012-13

		2011-12	2012-13
No. of Station		89	89
No. of Junctions		2	2
Average no. of Trains Running/ Week	Mail / Exp: Train	559	604
	Passengers/ Trains	339	340
Average no. of Passengers / day		210175	214095

Air Transport

Air Transport is the fastest and comfortable mode of transporatation. Kerala has three Airports at Thiruvananthapuram, Kochi and Kozhikode handling both International and Domestic flights. Thiruvananthapuram and Kozhikode Air ports are owned by Government of India and Kochi Airport is owned by Cochin International Air port Ltd (CIAL), a company set up by Government of Kerala with public private participation. The details of the flights operated during 2012-13 by various agencies at these three airports are given in Tables1.22, 1.23 &1.28.

Trivandrum International Airport

Trivandrum International Airport (IATA: TRV, ICAO: VOTV) is located in Thiruvananthapuram and is the first airport in the state of Kerala, India. It is the first international airport in a non-metro city in India TIA is considered as an "all weather" airport in the country and is ISO 9001-2000 certified. Owing to this many flights from Cochin and Calicut are diverted here whenever weather hinders visibility in the respective airports. It is the 8th busiest airport in the country in terms of international passenger traffic and 10th busiest in terms of overall passenger traffic. The Trivandrum International terminal is located approximately 3.7 km (2.3 mi) due west from the city centre, 16 km (9.9 mi) from Kovalam beach, 9.4 km (5.8 mi) from Technopark Trivandrum and 21 km (13 mi) from the proposed Vizhinjam International Seaport.Trivandrum International Airport is the second largest and the second busiest airport in Kerala after Cochin International Airport. In addition to civil operations, Trivandrum Airport also caters to the Indian Air Force (IAF) and the Coast Guard for their strategic operations. IAF have an exclusive apron to handle all their operations. Trivandrum airport also caters for the Rajiv Gandhi Academy for Aviation Technology, which carries out pilot training activities.

2.22 Details of flights operated by various agencies from Thiruvananthapuram International Airport 2011-12 & 2012-13

Sl. No	Airlines	2011-12				2012-13			
		No.of Flights movements		Passengers		No.of Flights movements		Passengers	
		DOM	INT	DOM	INT	DOM	INT	DOM	INT
1	Air Indian Corpn.		460		67036		120		32440
2	Srilankan Airliness		732		86367		428		55046
3	GulfAirlineCorporation								
4	Tiger Airways		313		44040		186		22344
5	Indian DOM&INT	3428	1424	270407	125750	1730	856	146071	68236
6	Kuwait Airways		418		75049		244		48036
7	Oman Airways		732		92135		428		59078
8	Qatar Airways		732		115729		428		69668
9	Silkair						214		20787
10	Emirates		1248		293797		728		177355
11	Air India Express		2814		329811		1479		196268
12	Air Arabia		1464		212724		856		129010
13	Ethinad		732		99424		428		54190
14	Jet Airways	3124	1732	216587	206418	864	856	99721	122437
15	Maidivian		1420		55519		496		19866
16	Mihin lanka								
17	Air Deccan								
18	Indigo Air	2884		358814		1948	425	229250	60443
19	Air sahara					60		7900	
20	Paramount								
21	Air Asia								
22	Kingfisher	1556	76	95761	816				
23	Non-Schedule	124	790	368	164				
	Total	**11116**	**15413**	**941937**	**1834534**	**4602**	**8172**	**482942**	**1135204**

Cochin International Airport Ltd

Cochin International Airport (IATA: COK, ICAO: VOCI) is an international airport serving the city of Kochi. The airport is located in Nedumbassery, about 30 km (19 mi) northeast of Kochi, in the state of Kerala, India. It is the busiest and largest airport in the state of Kerala. The airport is the primary base for Air India Express operations and is a focus city for Air, Go Air, IndiGo, Jet Airways, JetLite and Spice Jet.

Cochin International Airport is the first airport in India developed under a Public-Private Partnership (PPP) model. The airport pioneered the concept of private investment in the airport sector after being incorporated as a public limited company, receiving investments from nearly 10,000 Non-Resident Indians (NRIs) from 30 countries. The airport handles approximately 13,000 passengers every day. 9 domestic airlines and 17 international airlines connect Cochin with nearly 30 destinations nationally and internationally.

The Domestic Terminal of Cochin International Airport is having 1, 00,000 sq.ft with a Peak Hour Handling Capacity of 400 arrival and 400 departing passengers. This terminal is equipped with most modern passengers with a yearly passenger handling capacity of 3 million passengers.

The International Terminal is having 4,78,000 sq.ft (Arrival Terminal-1,78,000 and Departure Terminal 3,00,000 sq.ft) with a peak Hour Handling Capacity of 1200 arrival and 1200 departing passengers. This terminal is equipped with world-class most modern facilities with a yearly passenger handling capacity of 6 million passengers. The airport is having one of the largest and well-developed cars parking area, which can accommodate approximately 1100 cars at a time.

At present, Cochin International Airport is having 15 aircraft parking stands and exclusive parking stand for parking of general aviation and helicopters. Cochin International is having separate terminals for International Cargo, Domestic Cargo and Perishable Cargo .The perishable Cargo Centre, with state of the art facilities is equipped to handle 25,000 MT perishable Cargo per annum. Cochin International Airport has also constructed a Golf Course, Trade/Exhibition Centre,Airport Museum, 110 KV Sub Station, Aircraft Hanger etc.

The construction of the Radar Building and Duty Free Godown is nearing completion. The work of the 2nd phase expansion of the Golf Course is going on.CIAL is also planning to widen the Athani-Airport connecting road and also construction of a new International Terminal Building, Sports Complex etc.

2.23 Cochin International Airport Limited 2012-13

Year	International Terminal						Domestic Terminal						Total Movements (IT+DT)		% INCREASE OVER LAST YEAR	
	A/C movements			PAX movements			A/C movements			PAX movements						
	ARR	DEP	TOTAL	ARR	DEP	TOTAL	ARR	DEP	TOTAL	ARR	DEP	TOTAL	A/C	PASSENGER	A/C	PAX
2012-13	9983	10303	20286	1450986	1483031	2934017	10781	10471	21252	998686	967284	1965970	41538	4899987	0.96	3.74

Source: Airport Authority

2.24 Details of flights operated by various agencies from Cochin International Airport 2011-12 & 2012-13

Sl.No	Airlines	2011-12				2012-13			
		No of Flights		Passengers		No of Flights		Passengers	
		DOM	INT	DOM	INT	DOM	INT	DOM	INT
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	Air India		700		65741		2017		201703
2	Air India Express		4415		438995		2963		291105
3	Indian Airlines		710		69872		710		79455
4	Oman Air		732		96655		732		97226
5	Silk Air		732		85734		808		91606
6	Kuwait Airways		724		135781		726		139233
7	Emirates Airlines		1472		438472		1464		439174
8	Qatar Airways		1152		172396		1146		181144
9	Saudi Arabian Airlines		410		128298		416		175826
10	Srilankan Airways		732		87408		1368		146938
11	Gulf Air		731		91314		733		102243
12	NAS Air		26		3553				
13	Air Arabia		1466		228429		1464		232076
14	Baharin Air		534		53933		452		55899
15	Ethihad Airways		730		116770		806		138092
16	Jet Airways		2150		266214	5811	2328	529292	299806
17	AirAsia		732		101648		780		103777

18	Tiger Airways						388		46878
19	King Fisher Airlines		72		922	2		8	
20	Non Scheduled Flights		104		5897				
21	Indian Airlines	4220		334236					
22	Allianz Air	882		13747					
23	Jet Airways	4980		483927					
24	Jet Lite	738		107811		7		677	
25	King Fisher Airlines	3680		244771					
26	Go Air	1032		129832		730		92160	
27	Interglobe Aviation	3472		420724		3825	437	447621	65185
28	Spice Jet Limited	2816		396268		5371	469	616070	44547
29	Pavwan Hans-kavaratti	535		2805		591		3117	
30	PH to ONGC	6		0					
31	Jyothi Aviation	79		134		179		284	
32	Shobha Puravankara	4		12		32		109	
33	Kalyan Jwellers	8		45		164		444	
34	Chipsan/Kalyan	7				88		196	
35	Heligo Charters	10		63					
36	United Helicharters	22		32					
37	Difence Movements	26		21		44		53	
38	Non Scheduled Flights	300		933		297	79	763	2124
	Total	**22817**	**18324**	**2135361**	**2588032**	**17149**	**20286**	**1690801**	**2934017**

Source: ***Infrastructure Statistics 2012-13***

Calicut International Airport

Calicut International Airport (IATA: CCJ, ICAO:VOCL), also known as Karipur Airport, is an International Airport serving the cities of Kozhikode (Calicut) and Malappuram in Kerala, India. The airport is located in Karipur, Malappuram district about 28 km (17 mi) from the Kozhikode Railway Station and 25 km (16 mi) from the city of Malappuram, with the closest railway station being at Feroke. Air India Express has a base at the airport. It is the *seventh busiest* airport in the country in terms of international passenger traffic and the *ninth busiest* airport in India in terms of overall passenger traffic .The airport was given the international airport status on 2nd February 2006, thereby paving the way for the improvement of infrastructure for handling international flights. It is the third busiest airport in Kerala.

Statistics (2012-2013)	
Passenger movements	2294410
Aircraft movements	16866
Cargo tonnage	27612

Source: Airport Authority of India

2.25 Details as per financial year 2011-12 & 2012-13

(Figures in 000s & Cargo in tonnes)

	2011-12	2012-13
Passenger traffic handled-International	1982 .955	1982 .774
Passenger traffic handled-Domestic	226 .969	311 .636
No. of flights handled-International	12 .863	11 .459
No. of flights handled-Domestic	3 .437	5 .407
Average no.of pax handled per day-International	5 .43275342	5 .43225753
Average no.of pax handled per day-Domestic	0 .621832877	0 .85379726
Average no.of cargo handled per day-International	69 .5945452	74 .6748055
Average no.of cargo handled per day-Domestic	0 .52188493	0 .9737589

Source: Airport Authority of India

2.26 International cargo handled at Calicut International Airport 2012-13

(Figures in Metric Tons)

Period	Export	Import	Total	% increase
2012 - 13	18591.426	8664.878	2725.6304	+7.3%

Source: Airport Authority

2.27 Domestic Cargo Handled at Calicut International Airport 2012-13

Period	Export	Import	Total	% increase
2012 -13	115.100	240.322	355.422	+86.58%

Source: Airport Authority

2.28 Calicut International Airport Limited 2012-13

Year	International Terminal						Domestic Terminal						Total Movements (IT+DT)		% INCREASE OVER LAST YEAR	
	A/C movements			PAX movements			A/C movements			PAX movements						
	ARR	DEP	TOTAL	ARR	DEP	TOTAL	ARR	DEP	TOTAL	ARR	DEP	TOTAL	A/C	PASSENGER	A/C	PAX
2012-13	5,718	5,741	11,459	961,470	1021304	1982774	2715	2692	5407	155699	155937	311636	16866	2294410	3.47%	3.82%

Source: Airport Authority of India

2.29 Details of flights operated by various agencies from Calicut International Airport 2011-12 & 2012-13

Sl.No	Airlines	2011-12				2012-13			
		No.of Flights movements		Passengers		No.of Flights movements		Passengers	
		DOM	INT	DOM	INT	DOM	INT	DOM	INT
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	Air India-DOM:&INT	191	983	4992	271896	357	755	17688	224239
2	Air India Express-Dom &Int	437	4475	35520	508984	1282	3534	36734	489906
3	Air Arabia	0	738	0	119548		732		119802

4	Nas Express	0	588	0	74120	0	60	0	6014
5	Behrain Airlines	0	518	0	57276		456		58732
6	Etihad Airways	0	315	0	46358		513		84913
7	Emirates	0	1178	0	330413		1182		335609
8	Indian Airlines	716	1412	51859	167499	744	1452	56032	192201
9	Jet Konnect	732	0	99394	0	664		86421	
10	Jet Airways	0	0	0	0	66	0	8186	0
11	Kingfisher Airlines	528		25009	0	0	0	0	0
12	Alliance Air	651	-	9951	-	159	-	2460	
13	Oman Air	0	732	0	99354		734		102601
14	Qatar Airways	0	866	0	113788		790		120306
15	Rak Airways	0	474	0	54823		510		65504
16	Saudi Airways	0	574	0	138888		732		182929
17	Spice Jet	0	0	0	0	2004		103866	
18	Others(private/ chartered)	180	12	241	11	130	10	249	18
	TOTAL	**3435**	**12865**	**226966**	**1982958**	**5406**	**11460**	**311636**	**1982774**

Source: Airport Authority

Kannur International Airport

Kannur International Airport is an upcoming international airport located at Mattanur in Kannur District, Kerala, India. This airport is the fourth international airport in Kerala. Kannur International Airport is expected to be operational by 2015. Kannur Airport is located at a distance of 25 km Kannur.The airport location is 19 kilometres away from National Highway 17(NH-17) and 4 kilometres away from Tellicherry-Mysore Highway (SH-30). Kannur-Mattannur Road, a new green field road, has been planned as the main access to the airport to ensure fast and free movement of traffic. It will not have any traffic junctions, and will have provision for entry and exit ramps for joining and exiting traffic from connecting roads. More than 8 roads are to be developed for connecting to the Airport, which, ncludes Kannur (Melechovva) Mattannur road, Thalassery-Mattannur Road, ThalasseryAnjarakandyAirport road, Thalassery Nadapram Road, Karnataka Border Koottupuzha /Makutta) Mattannur Road, Wayanad (Mananthavadi) Nedumpoil Mattannur road, Payyannur/ Ezhimala Mattannur road, Thalassery Mahe Bypass, etc. Thalassery–Mattannur road will be upgraded to 4/6 lanes, considering the availability of required land for widening. Other related roads will be widened and upgraded with high quality surfacing and constructing new bridges and culverts. Approximately, Rs. 300 crore are expected as the cost for the development of access roads to the Airport.

According to a detailed project report prepared by CIAL, in 2015, the number of domestic passengers expected to use the airport is 0.61 million, and international passengers 1.32 million. The number of passenger estimated to use the airport in 2021 is 2.94 million. Number of international passengers are expected to be 2.03 million and domestic passengers will be 0.91 million.

Cargo Traffic

Kerala State Industrial Enterprises Ltd

Kerala State Industrial Enterprises Ltd is a Government of Kerala undertaking and as part of their diversification program; they are into the sea cargo operations and thus decided to start a Container Freight Station. They started the construction of the same at Eloor along side ICTT Road near Kalamassery. It is so designed to extend impeccable freight management. It is characterized with exceptional features like.

- Hardly 15 kilometres away from the Vallarpadam International Container Transshipment Terminal and along side the new ICTT Highway with easy and trouble-free access to our CFS.
- App.4 acres of finished yard for the free movement of vehicles and equipments with distinct areas to stack containers.
- Elegantly designed Administrative Block with space to spare for User Agencies, CHAs, Liners, Banks etc.
- 40 Ton Reach Stacker for mounting and grounding the Containers
- 2 Nos., 3 Ton Fork lifts to move cargo from containers to warehouse and within warehouse.
- Sufficient Electric points for Freezer containers
- Separate Import and Export warehouses of total area 53000sq.ft
- 100 Ton In house Weighment facility.
- In house Container tracking facility.
- 24X7 power maintained by dedicated 250 KVA genset
- Fully mechanized containers and cargo movement in the yard.
- In house banking facility (proposed)
- Experienced supporting staff
- Sufficient lighting to yard by two High Mast lights
- In house Canteen
- 24 hrs Watch and ward.

3. COMMUNICATION

Communication means exchange of information, ideas or feelings from one person to another. The word “communicate” comes from the Latin word Communicare, which means “to Share” or to “make common”. Communication makes it possible for people to share their knowledge, add to it, and pass it on to the future generation. An effective communication network is essential not only for the requirement of travel and transport but also for socio-economic development of a state and country.

Postal Communication

In terms of area covered and population served, the Indian Postal network is amongst the largest networks in the world. These post offices provide a number of services, broadly classified into four categories: Communication services (letters, post cards), Transportation services (parcel, Logistics post), Financial services (savings Bank, Money order, International Money Transfer Service, Public Private Partnerships for extending financial service outreach through the post office network, Postal Life Insurance and Premium Value Added Services (like Speed Post, Business Post, Retail Post).

Kerala Postal circle includes the entire State of Kerala, the Union Territory of Lakshadweep islands and Mahe under the Union Territory of Pondicherry. Kerala is the only postal circle where every village has at least one post office. During 2010-11, there are 5067 post offices in Kerala. These post offices are categorized as Head Post Offices, Sub-Post Offices and Branch Post Offices. There are 51 Head Post Offices, 1455 Sub-Post Offices, 2 ED Sub Offices and 3559 Branch Post Offices.

3.1 Analysis of Expenditure of Kerala Postal Circle During2012-13

Head of Account	2012-13 (Rs. in crores)	
	Allt.	Exp.
3201-Working Expenses (Non-Plan)	498 .75	527. 20
Audit & Pensionery Charges	231. 50	239. 73
3201-Working Expenses including audit & Pensionary charges	730. 25	766. 93
PLI/RPLI	3. 83	4. 32
5201-Capital Outlay (Non -Plan)	0. 00	0. 00
PLAN		
3201-Revenue (Plan)	1. 39	1. 50
5201-Capital Outlay (Plan)	4. 30	4. 24
Total – PLAN	**5. 69**	**5. 74**

Source: Department of post

3.2 Revenue Achievement of Kerala Postal Circle for the YEAR 2012-13

(Rs.in crores)

Head of Account	Rev 2012-13 (Rs.in crores)
Postage realized in Cash	30 . 59
Sale of Postage Stamps	54 . 92
Sale of Service Stamps	5 . 65
Commission on IMOs/IPOs	96 . 36
Others	2 . 56
Postal Operations-Total	190 . 08
Business Development	79 . 95
SB/CC Work	199 . 2
Grand Total	**469 . 23**

Source: Department of Post

Telecommunication

Bharat Sanchar Nigam Limited (BSNL)

Telecom is a very fast growing sector of the economy. The telecommunication has shown tremendous growth in the past few years particularly with the launching of cellular services in the State. Connecting all the panchayats through telephones is an important national goal. Kerala Telecom circle serves the whole of Kerala State, the Union Territory of Lakshadweep and part of Union Territory of Pondicherry (Mahe)

Kerala has an impressive record of performance in Telecom Sector. It was in this state that all the telephone exchanges were made automatic for the first time in the whole country, way back in 1990. In 1992, we become the first state to provide Public Telephone facilities in all panchayat Head Quarters. Kerala is also the first state to provide public telephone in every village; by 1995. Connecting all the villages through telephones is an important national goal. Again it has the unique status of providing STD facility to all telephone exchanges. In the mobile segment there has been a boom in the state. The Internet is another growing mode of communication and there are worldwide systems of computer networks. Broadband is often called high speed internet, because it usually has a high rate of data transmission.

3.3 District-wise estimated No. of fixed phones 2012-13

District	2012-13
THIRUVANANTHAPURAM	293278
KOLLAM	248665
PATHANAMTHITTA	154835
ALAPPUZHA	198565
KOTTAYAM	221755
IDUKKI	77789
ERANAKULAM	350247
THRISSUR	335400
PALAKKAD	157658
MALAPPURAM	255510
KOZHIKODE	220414
WAYANAD	45230
KANNUR	255377
KASARAGOD	114536
PONDICHERRY (MAHE)	5079
LAKSHADWEEP	6412
TOTAL	**2940750**

Source: BSNL

3.4 District-wise estimated No. of Landline + WLL+ Mobile 2012-13

District	2012-13
THIRUVANANTHAPURAM	1161726
KOLLAM	777996
PATHANAMTHITTA	519220
ALAPPUZHA	616856
KOTTAYAM	887035
IDUKKI	396120
ERANAKULAM	1335916
THRISSUR	918316
PALAKKAD	684261
MALAPPURAM	801594
KOZHIKODE	850791
WAYANAD	202172
KANNUR	1071832
KASARAGOD	361996
PONDICHERRY (MAHE)	14817
LAKSHADWEEP	60779
TOTAL	**10661427**

Source: BSNL

3.5 District-wise Teledensity per 1000 population (Fixedline+WLL+Mobile) 2012-13

District	2012-13
THIRUVANANTHAPURAM	359.11
KOLLAM	301.08
PATHANAMTHITTA	421.44
ALAPPUZHA	293.04
KOTTAYAM	454.42
IDUKKI	350.86
ERANAKULAM	431.22
THRISSUR	308.68
PALAKKAD	261.47
MALAPPURAM	220.82
KOZHIKODE	295.62
WAYANAD	256.89
KANNUR	444.37
KASARAGOD	300.91
PONDICHERRY (MAHE)	493.9
LAKSHADWEEP	996.38
TOTAL	**333.92**

Source: BSNL

3.6 District-wise estimated No. of Exchanges 2012 - 13

District		2012-13
Thiruvananthapuram	Rural	68
	Urban	27
Kollam	Rural	76
	Urban	9
Pathanmathitta	Rural	77
	Urban	7
Alappuzha	Rural	52
	Urban	20
Kottayam	Rural	83
	Urban	17
Idukki	Rural	77
	Urban	3
Ernakulam	Rural	72
	Urban	50
Thrissur	Rural	63
	Urban	24
Palakkad	Rural	100
	Urban	17
Malappuram	Rural	89
	Urban	6
Kozhikode	Rural	61
	Urban	32
Wayanad	Rural	30
	Urban	1
Kannur	Rural	86
	Urban	27
Kasaragod	Rural	56
	Urban	6
Pondicherry(mahe)	Rural	0
	Urban	1
Lakshadweep	Rural	8
	Urban	3
Rural		**998**
Urban		**250**
TOT A L		**1248**

Source: BSNL

4 Power

Power or electricity is the essential source of commercial energy which is a vital component for sustained Economic Growth of the economy. Energy is a basic requirement for all facts of our life, it is also a basic human need and is a critical infrastructure on which the socio-economic development of the country. In addition to it, its widely recognized role as a catalyst to economic activity in different sectors of economy, the power sector makes a direct and significant contribution to economy in terms of revenue generation, employment opportunities and enhancing the quality of life. The increase of demand of power means the economy is growing and is leading to modernization, industrialization and improvement in basic amenities culminating into better quality of life of the people. It provides light and fuel to millions of households, electricity to industry, agriculture, commerce, all service sectors and so on. The hall mark of development of an economy depends more on energy than any other thing.

Hydro power is recognized as an environment friendly source of energy which is non polluting and economical. The State of Kerala is bestowed with hydel potential which if exploited fully will provide a strong thrust to economy of the State. The optimal exploitation of the available hydel resources in the State would not only meet the State's demand but will ensure supply of power to National grid to boost the overall development of the country. The Hydro Generated power is environmentally clean energy source, besides being the cheapest source of energy. Hydropower also offers unique possibilities to manage the power network by its ability to quickly respond to peak demands. Pumping-storage plants, using power produced during the night, while the demand is low, is used to pump water up to the higher reservoir. That water is then used during the peak demand period to produce electricity. This system today constitutes the only economic mass storage available for electricity. Hydroelectric power plants generally range in size from several hundred kilowatts to several hundred megawatts.

Power Sector in Kerala

Power Sector in Kerala plays a vital role in all developmental activities in Kerala. Obviously power crisis is the prime obstacle to start new initiatives in the industrial field. The need for power is increasing and the production of power should be increased accordingly. Monsoon is essential to sustain the hydropower base in the State. As we depend monsoon for the hydropower generation of power generation, the shortage in rainfall usually creates power crisis. The State of Kerala is rich in renewable sources of energy in the form of water resources. Kerala State Electricity Board is a public sector agency Established in 1957 under the authority of the Department of Power of Kerala government. Kerala State Electricity Board (KSEB) has taken several initiatives to improve the physical and financial performances. During the past several years KSEB has been responsible for the generation, transmission and supply of electricity in the State, with particular emphasis to provide electricity at affordable cost to the domestic as well as for agricultural purposes. The Board has set up adequate generation capacity and transmission network and Kerala is one of the few states in the country having availability of power to meet the demand.

Power Generation

Main source of Energy generation in Kerala is Hydroelectric Power. Hydro power development in Kerala begins with the commissioning of Pallivasal Hydro Electric Project in 1940.Sabarigiri in 1966 and Idukki in 1976 are the milestones of Kerala State Electricity Board. Biggest Hydroelectric Project in Kerala is Idukki .Idukki power project includes Idukki,Cheruthonni and Kilivallithode dams.Important hydel projects in river Periyar include Pallivasal, Chenkulam, Idukki, Panniyar, Neryamangalam, Idamalayar and Lower Periyar.

Power System in Kerala consisted of Hydel, thermal and wind sources.Hydel energy is the most reliable and dependable source in Kerala.Of the total installed capacity, 2878 .445MW during 2012-13, the lion's share of 2053 .15 MW installed capacity comes from 24 hydel stations, 791.616 of MW is from the thermal projects including NTPC at Kayamkulam which is Kerala's dedicated thermal station. Two Diesel power plants are at Brahmaputra and Nallalam.Wind farm power projects of Kerala are at Kanchikode and Ramakkalmedu.

4.1 Generation installed capacity (MW) 2012-13

Sl. No	Source of Energy	Capacity (MW)	Firm Annual Generation Capability (MU)
1.	Hydel-KSEB	2008.65	7073.94
2.	Thermal:KSEB	234.6	1502
3.	Wind-KSEB	2.025	4
4.	Hydel-Pvt	44.5	160.22
5.	Thermal-Pvt	197.44	1376.7
6.	Wind-Pvt	31.65	67.52
7.	NTPC	359.58	2158
Total		**2878.445**	**12342.38**
8.	Hydro-renewable	148.4	533.16
9.	RES*-MNRE	65.15	193.22

***Renewable Energy Sources**
Source: KSEB

4.2 Generating Capacity, Maximum Demand and Load Factor 2011-12 & 2012-13

Sl. No	Year	Installed Capacity (MW)*	Total Energy (MU) (Generation Purchase-Export)	Maximum Demand	Load Factor (%)
1	2011-12	2875.7	19420.35	3348	66.2
2	2012-13	2878.45	20300.01	3268	66.32

Source: KSEB

4.3 Generation of Power at Different Stations (in MU) 2011-12 & 2012-13

Station	2011-12	2012-13
Brahmapuram, EKLM	57.117	80.249
BSES (Gas- IPP)	46.6105	131.3319
Chembukadavu	11.9937	9.358
Idamalayar	348.989	249.627
Idukki	3041.71	1562.71
Kakkad	231.53	140.463
Kallada	65.626	21.81
Kanjikode (wind farm)	2.033	1.763
Kayamkulam	474.937	1508.733
KPCL(IPP)-Kasargode	10	2.6
Kozhikkode (KDPP)	233.87	438.705
Kuttiyadi	766.019	501.233
Kuthunkal(Hydro captive)-Idukki	51.363	23.6
Lower periyar	648.64	356.49
Lower Meenmutty	4.8631	2.159
Maniyar (PVT)	36.982	21.39
Mattupetty-Idukki	1.2187	2.446
Malankara	31.944	26.47
Neriamangalam	360.5332	231.71
Pallivasal	231.4545	169.607
Panniyar	184.47	90.107
Peppara	8.1963	3.69
Poringal Kuthu	167.1332	129.358
Poringal LBE	102.1485	99.036
Sabarigiri	1434.71	862.34
Sengulam	162.2723	107.294
Sholayar	220.359	209.27
Urumi 1&2-Kozhikode	13.2681	10.6

Source: KSEB

Power consumption

Power consumption has increased substantially over the year. Domestic as well as commercial consumption, Railway traction, Agricultural pumping and Licensees increased. The sale of energy has increased corresponding to the increase of total consumers. In the year 2012-13, the domestic consumed about 49.37percent of the total consumption.Similarly, the commercial consumption is 13.21 and for the industrial purposes there is about 29.74 percent. The detail of consumption and revenue collected during 2012-13 is as shown below.

4.4 Power Consumption (in MU) and Revenue Collected (Rs. in Lakhs) in Kerala 2011-12

Category	No. of Consumers	Energy Sold	Sales %	Connected load (MW)	Revenue in Rs	Revenue %
Domestic	8324961	7705 .86	46.85	11096 .17	15318447928	27 .39
Commercial LT+HT	1539025	2141 .22	13.3	2635 .81	15928274256	28 .48
Public Lightning	3160	294 .26	1.81	93 .12	638584595	1 .142
Agricultural	455078	286 .18	1.58	926 .68	307703972	0 .55
Industrial LT	132051	1097. 04	7.18	1560 .32	4613885062	8 .249
Industrial HT & EHT	3341	3829 .39	24.27	1057 .38	16007502180	28 .62
Railway Traction	8	154 .49	1.07	65 .27	616808698	1 .103
Licensees	13	472 .09	3.05	83 .67	1832669381	3 .277
Export	0	201 .1	.89	0	383729110	1 .191

Source: KSEB

4.5 Power Consumption (in MU) and Revenue Collected (Rs. in Lakhs) in Kerala 2012-13

Category	No. of Consumers	Energy Sold	Sales %	Connected load (MW)	Revenue	Revenue %
Domestic	8573938	8313.36	49.37	11842.36	215416.04	29.82
Commercial LT+HT	1633952	2224.06	13.21	2790.58	185538.13	25.68
Public Lightning	3505	313.2	1.86	105.7	9431.88	1.3
Agricultural	460263	306.08	1.82	956.77	4727.84	0.65
Industrial LT	131583	1101.96	6.54	1539.24	58711.78	8.1
Industrial HT&EHT	3631	3905.15	23.199	1140.19	214639.81	29.71
Railway Traction	8	173.67	1.03	65.27	8250.05	1.14
Licensees	10	500.76	2.97	83.42	25530.56	3.53
Export	-	--	-	-	93.27	0.01

Source: KSEB

4.6 Category wise Sales of Energy in Kerala (in MU) 2011-12 & 2012-13

Category	2011-12	2012-13
Domestic	7705.86	8313.36
Commercial	2141.22	2224.06
Industrial LT	1097.04	1101.96
Industrial HT & EHT	3829.39	3905.15
Public lighting	294.26	313.2
Agriculture	286.18	306.08
Railways	154.49	173.67
Licence	472.09	500.76
Export	201.1	0
Total	**16181.63**	**16838.24**

Source: KSEB

4.7 Consumers and Connected Load 2011-12 & 2012-13

Year	No. of consumers at the end of the year	Connected load in KW at the end of the year
2011-12	10457637	17518.42
2012-13	10806890	18523.51

Source: KSEB

Growth Of Kerala Power System

The installed capacity has been increased to 2878.45MW as on March 2013 as against the 2639.845 MW in the previous year. Likewise, per-capita consumption has also been increased by 595 KWh from 567 KWh.The details of growth of power system in Kerala is seen in Table 3.7

4.8 Growth of Power System in Kerala 2011-12 &2012-13

Sl. No	Particulars	March 2012	March 2013
(1)	(2)	(3)	(4)
1.	Installed capacity (MW)	2639.845	2878.45
2.	Maximum demand(system) –MW	3348	3268
3.	Generation per Annum-MU	8350.74	5383.22
4.	Purchase per Annum-MW	11270.71	14916.79
5.	Export per Annum-MU	201.1	0
6.	Energy sales per Annum-MU	15980.53	16838.24
7.	Percentage of energy loses to energy available for sales	27.52	20.55
8.	Per capita consumption-KWh	567	595
9.	220KV line-CT Kms	1763.26	1769.96
10.	110KV line-CT Kms	2711.21	2720.42

(1)	(2)	(3)	(4)
11.	66 KV line-CT Kms	2122.08	2122.14
12.	33KV line-CT Kms	1197.73	1265.71
13.	22KV line-CT Kms	103	103
14.	11KV line-CT Kms	51362	52842
15.	LT line- CT Kms	270718	273274
16.	Step Up Transformer capacity –MVA	2689.1	2690.7
17.	No of EHT substations	-	-
a.	400 KV	1	1
b.	220 KV	18	18
C	110KV	131	132
D	66 KV	80	81
E	33 KV	120	128
18	Step down Transformer capacity (MVA)	16556	16965
19a	Distribution Transformers (Nos)	62583	64972
B	Capacity(MVA)	7673.92	7940.37
20	No of Villages electrified	1364	1364
21	No of consumers (in Lakhs)	104.58	108.09
22	Connected load(MW)	17518.42	18523
23	No of Street light	1218610	1257285
24	No of Irrigation pumps	455078	466289
25	Total revenue per Annum(Rs lakhs)	559301.73	722339

Source: KSEB

Power Transmission

Transmission is an important factor to evacuate the power in different parts of Kerala. Transmission of Electricity means bulk transfer of power over a long distance at high voltage, generally of 132 KV and above. A good transmission system is necessary to the effective distribution and to bring power from outside the State. In order to transfer the power from point of generation to point of consumption effectively, the Transmission and Distribution infrastructure needs development. Transmission network in Kerala is connected to the Southern Region Transmission system through two 400KV double circuit line at Madakkathara (Thrissur) and Pallippuram (Thiruvananthapuram). Another 400KV substation at Arecode (Malappuram) is being constructed by Power Grid Corporation of India Limited (PGCIL) Kerala's Transmission system consisting of substations and its connected lines are given below**:**

4.9 Transmission Infrastructure (2012-13)

Sl. No	Item	Target	Unit	Achievement	Unit	Percentage of Achievement
1	400KVSubstation	0	Nos	0	Nos	0
2	220KVSubstation	2	Nos	0	Nos	0
3	110KVSubstation	8	Nos	1	Nos	12.5
4	66KVSubstation	6	Nos	1	Nos	16.66
5	33KVSubstation	19	Nos	8	Nos	42.1

Source: KSEB

4.10 Transmission facilities in Kerala (2012-13)

Capacity	Substation(nos)	Lines(CT Km)
400 KV	1	417*
220KV	18	1769.96
110 KV	132	2720.42
66 KV	81	2122.14
33 KV	128	1265.71
Total	**360**	**8295.23**

Source: KSEB

***Owned by PGCIL**

Power Distribution

Distribution sector is a profound area, which provides electricity to all consumers in Kerala. Kerala has achieved full electrification in all villages, which is above average of national level. KSEB has given great attention to strengthen the distribution backbone by new ventures. The power consumption comes to all time high. As on 2012-13, the total number of consumers has increased to 10806890 nos aganist the 10457637 during 2011-12. The distribution infrastructure is an essential part of electrifying to all domestic and nondomestic purpose. The target and achievement of the distribution infrastructure during 2012-13 is given in the Table:

4.11 Targets and Achievements of distribution Infrastructure 2011-12

Sl.No	Item	Target	Unit	Achievement	Unit	Percentage of Achievement
1	11KV Lines	4694.11	Kms	2572.24	Kms	54.8
2	Distribution Transformer	5383	Nos	4375	Nos	81.27
3	L.T Lines	2821.7	Kms	4089	Kms	144.91
4	Service Connections	332303	Nos	413667	Nos	124.49

Source: KSEB

4.12 Targets and Achievements of distribution Infrastructure 2012-13

Sl.No	Item	Target	Unit	Achievement	Unit	Percentage of Achievement
1	11KV Lines	3325 .25	Kms	1553	Kms	46 .7
2	Distribution Transformer	3843	Nos	2598	Nos	67 .6
3	L.T Lines	2402 .7	Kms	2999	Kms	124 .81
4	Service Connections	256459	Nos	230433	Nos	89 .85

Source: KSEB

4.13 Transmission & Distribution Lines 2011-12 & 2012-13

Sl.No	Year	Transmission & Distribution Lines(in Km)						LT
		220KV	110KV	66KV	33KV	22KV	11KV	
1	2011-12	1763.26	2711.21	2122.08	1197.73	103	51392	270718
2	2012-13	1769.96	2720.42	2122.14	1265.71	103	52842	273274

Source: KSEB

Transmission and Distribution Loss (T& D loss)

Power which is supplied to various categories of consumers passes through various stages before it finally reaches the premises of the consumers. It involves transformation to higher voltage level, wheeling on high voltage line, transformation at various stages. The entire process itself involves energy losses known as Transmission and Distribution Loss (T& D loss).The main reasons for such high losses are technical as well as commercial. The high technical losses are due to existing outdated system. To minimize such losses, the system needs up-gradation and improvements. KSEB made significant achievement in the field of reducing the T&D loss. During 2003-04 onwards, T&D loss was considerably reduced by way of faulty meter replacement, intensification of theft detection, installation of new substations and lines, upgradation and modernization of sub transmission and distribution network through Accelerated Power Development and Reforms Programme .During 2012-13, T&D loss has come down to 15.3 percent from 15.65 percent in 2011-12 .The energy loss in the KSEB system is accounted as internal loss. It can be seen in the Table below:

4.14 Generation sales and T&D loss 2011-12 & 2012-13

Sl.No	Year	Gene-ration MU	Auxillary Consum-ption (MU)	Import (MU)	Export (MU)	Total Sales MU	Loss MU	% Loss	
								Sys-tem	Inter-nal
1	2011-12	8350.74	60.85	11270.71	201.1	16181.63	3378.97	17.45	15.65
2	2012-13	5383.22	55.35	14916.79	0	16838.24	3406.42	16.83	15.3

Rural Electrification

With the availability of power, the number of pump sets energized, streetlights and distribution transformer installed have increased over the years. In 2011-12, the number of pump sets energized were 455078 which has risen to 466289 in 2012-13.Similarly, the installation of street lights and distribution transformers increased. It can be shown in the table below:-

4.15 Pump sets Energized and Street lights installed 2011-12 & 2012-13

Year	No of Pump sets Energized	No of Street lights Installed	No of distribution Transformers
2011-12	455078	1218610	62583
2012-13	466289	1257285	64972

Source: KSEB

4.16 All India Generating Installed Electricity Generation Capacity 2012-13

Name of State/U.Ts	Hydro	Coal	Diesel	Gas	Nuclear	RES*	Total
Northern Region	15467.7	32413.5	12.99	4781.26	1620	5589.25	59884.75
Western Region	7447.5	49257.01	17.48	8988.3	1840	8986.93	76537.22
Southern Region	11353.03	25032.5	939.32	4962.78	1320	12251.85	55859.48
Eastern Region	3981.12	23457.8	17.2	190	0	454.91	28101.03
North Eastern Region	1242	60	142.74	1187.5	0	252.68	2884.92
Islands	0	0	70.02	0	0	6.1	76.12
Total (All India)	**39491.35**	**130220.81**	**1199.75**	**20109.84**	**4780**	**27541.72**	**223343.52**

Source: KSEB

Energy Consumption of Various Home Appliances

The domestic sector accounts for 30% of totalenergy consumption in the country. It would be useful to know which gadget consumers how much electricity. Economic use of home appliances can help in reducing bills. The following table shows the energy consumption of various appliances normally used at home.

Appliances	Rating (Watts)	Operating Hrs/Day	Units/Month
Incandescent Bulbs	40	6	7
	60	6	11
Fluorescent Tube light	40	10	12
Night Lamp	15	10	4.5
Mosquito Repellent	5	10	1.5
Fans	60	15	27
Air coolers	175	8	42
Air conditioners	1500	6	270
Refrigerator	225	15	101
Mixer/Blender	450	1	13.5
Toaster	800	0.5	12
Hot plate	1500	0.5	22.5
Oven	1000	1	30
Electric Kettle	1500	1	45
Electric Iron	1500	1	45
Water heater-Instant Type(1-2Ltr capacity)	3000	1	90
Water heater-storage Type(10-20Ltr capacity)	200	1	60
Immersion rod	1000	1	30
Vacuum cleaner	700	0.5	11
Washing machine	300	1	9
Water pump	750	1	22.5
TV	100	10	30
Audio system	50	2	3

Source:www.mercindia.org.in/pdf/TIPS_ON_ENERGY_SAVING.

5. MINING AND GEOLOGY

The land of Kerala is endowed with a number of occurances/ deposits of good quality minerals such as Heavy Mineral Sands (Ilmenite, Rutile, Zircon, Monazite, Sillimanite), Gold, Iron ore, Bauxite, Graphite, China Clay, Fire Clay, Tile and Brick Clay, Silica Sand, Lignite, Limestone, Lime shell, Dimension Stone (Granite), Gemstones, Magnesite, Steatite etc. However, mining activities on large scale are confined mainly to a few minerals - Heavy Mineral Sands, China Clay and to a lesser extent Limestone/Lime shell, Silica Sand and Granite. The state owns mineral deposits like limestone, limeshell, silica sand, bauxite, graphite, iron ore, granite Etc.These minerals are found in various districts providing base for forming various mineral based industries in the State. Kerala posses one of the world class deposits of minerals and sands and in the coastal tracts between Neendakara and Kayamkulam.Pazhayangadi, Kannur are some of the mineral based industries working in the State since several years. The resources of beautiful ornamental granites in the state are being exported to different countries. In fact, Heavy mineral sand and china clay contribute more than 90% of the total value of major production in the State. However, 75% of the mineral revenue comes from the minor minerals. For all the development activities, mineral is an essential commodity. The minerals deposited are found in various districts providing base for forming various mineral based industries in the State. Estimated available mineral reserves with occurrence and use are shown in Table 3.15 given below:

5.1 Available Resources for Mineral Industries

Minerals	Reserves (Million tones)	Occurance	Uses
Gold	0.55	Wayanad, Marudp, Nilambur, Malappuram	Manufacture of ornaments
Iron	83.4	Kozhikode (Eleyettimala, Naduvallur Nanminda, Cheruppa, Alampara) Malappuram (Korattimala)	Iron is useful in bu ilding (Bridge, highway, rail road, etc.) , transportation (car, train, boats, plane, etc.) , tools (knife , machines , etc.)
China clay	172	Thiruvananthapuram,Kollam, Kannur,Kasaragod	Ceramics, pottery, paper, textiles, Rubber and paints
Ball clay	1.67	Thiruvananthapuram(Nadayara) Kollam (Kumbalam, Kanjirotusser, Mulana) Kannur(Pattuvam,Karivalloor, Earipuram,Pazhayangadi)	Manufacture of Refractory products, Ceramic Granite Tiles, Glazed Tiles, Table Ware & High Tension Electric Insulators etc.
Fire clay	11.55	Kollam(Kundamon,Pallikkal), Alappuzha(Thamarakulam), Eranakulam(Amballoor, Kanjiramattom, Keezhumadu), Thrissur(Poomangalam) Kannur(Pattuvam)	Manufacture of firebrick and of various accessory utensils, such as crucibles, saggers, retorts, and glass pots, used in the metalworking industries
Silica	28.40	Coastal area of Alappuzha	Used in ceramics and to make glass with. It can also be used to strengthen iron and steel.
Bauxite	12.5	Thiruvananthapuram (mangalapram,Chilambil,Sasthavattom), Kolam.(Poruvazhy ,Aadichanalloor) Kannur, Kasaragod	Manufacture of Aluminum .It is used in cement, chemicals, face makeup, soda cans, dishwashers, siding for houses.
Lime shell	4.05	Alappuzha, Eranakulam (Vembanad lake), Kottayam, Thrissur (Vadanapally)Kannur (Payyannur, Thrikkkaripur)	Manufacture of a variety of products including white cements
Lime stone	24	Palakkad (Walayar)	Manufacture of cement, calcium carbide, Iron & steel Industry etc
Graphite	2.81	Thiruvananthapuram (Veli, Kuttichal), Eranakulam (vadakode) , Kottayam (Chirakadavu)	Crucible Foundry, Refractory, Paints & Lubricant Industries
Lignite	9.65	Kannur(madai),Kasaragod Nileswaram, Palayi	Used as fuel for steam electric power generation in some countries
Magnesite	0.037	Palakkad (Attapadi)	Refractory bricks for furnaces

Source: Dept of mining & Geology

The major mineral based industries like Indian Rare Earths Ltd, chavara, Kerala Minerals and Metals Ltd, chavara, Malabar cements, Walayar, Travancore cements Ltd, Kottayam, Kundara ceramics, Kollam, English IndianClays Ltd, Thiruvananthapuram, Excel Glass Industry, Alappuzha, Kerala Clays and Ceramic Products Ltd, Pazhayangadi, Kannur are some of the mineral based industries working in the State since several years. The resources of beautiful ornamental granites in the State are being exported to different countries

The Kerala Minerals and Metals Ltd (KMML) is the world's first fully integrated Titanium Dioxide Plant. KMML is also India's first and only manufacturer of Rutile Grade Titanium dioxide by chloride process

Indian Rare earths

- Incorporated on August 18, 1950. An ISO 9001, ISO 14001 & OHSAS 18001 Certified Company.
- IREL has four Production Plants viz. Minerals Division at Chavara,
- Manavalakurichi, OSCOM and Rare Earths Division at Aluva.
- Major Activity: Mining and separation of Heavy Minerals like, Ilmenite,
- Rutile,Zircon, Sillimanite, Garnet and Monazite from beach sand.
- Also engaged in chemical processing of Monazite to yield Thorium compounds, Rare Earth Chlorides and Tri-Sodium Phosphate.
- Products find use in manufacture of white pigments, welding electrodes, foundries, ceramics, refractory's, abrasives for polishing glass/ TV tubes and in sand blasting etc.
- Sales turnover exceeding 3600 million with export component over Rs 1000 Million.
- Provides Value for money to its Customers.
- Professional, Creative and Committed Workforce.

Details of Major Mineral Mines in Kerala

As on 31st March 2013, there are 81 major mineral mines that are operation in the State. The table given below includes the statistics of the mines. Total area covered by mining leases is 2727.9231 ha.

5.2 Details of Major Mineral Mines in Kerala 2012-13

Sl. No.	Name of major mineral	No. of mining leases
1	Graphite	1
2	China clay	34
3	Laterite	8
4	Irone ore	1
5	Quartz	2
6	Lime shell	5
7	Mineral sand	4
8	Lime Stone	1
9	Silica sand	25
Total		**81**

Source: Economic Review

5.3 Total area Covered by mining Leases 2012-13

Sl. No.	Minerals	Area in Hectares
1	Clay	94.082
2	Silica sand	32.2844
3	Bauxite	1.3737
4	Lime shell	1949.90
5	Limestone	245.69
6	Mineral sand	354.57
7	Quartz	50.023
Total		**2727.9231**

Source: Economic Review

5.4 Details of Mining lease in force 2012-13

Sl. No.	Name of Mineral	Total
1	Graphite	1
2	China clay	30
3	Laterite	7
4	Iron ore	1
5	Quartz	0
6	Lime shell	6
7	Mineral sand	4
8	Lime stone	1
9	Silica sand	30
10	Quartzite	1
Total		**81**

Source: Dept of mining & Geology

5.5 Statement showing number of Mining Leases in the State of Kerala 2012-13 (District wise and Mineral –wise)

Sl.No.	District	Name of Mineral									
		Graphite	China clay	Laterite	Iron ore	Quartz	Lime shell	Mineral sand	Lime stone	Silica sand	Quartzite
1	Thiruvanantha puram		28								
2	Kollam		2					4			
3	Pathanamthitta										
4	Alappuzha			1			2			30	
5	Kottayam						3				
6	Idukki										
7	Eranakulam	1									
8	Thrissur										
9	Palakkad						1		1		
10	Malappuram										
11	Kozhikode				1						1
12	Wayanad										
13	Kannur			5							
14	Kasaragode			1							
Total		**1**	**30**	**7**	**1**	**0**	**6**	**4**	**1**	**30**	**1**

Source: Dept of mining & Geology

Royalty

Mining and Geology Department is authorized to receive Royalty on extraction of major as well as minor minerals in the state at the rates fixed by the Government. The production and royalty of various major minerals and minor minerals in the State during the year 2011-12 & 2012-13 summarized are given below:

5.6 Production of Major Minerals in Kerala 2011-12 & 2012-13

Sl. No.	Major Mineral	Production in Tonnes		Royalty(Rs)	
		2011-12	2012-13	2011-12	2012-13
1	China clay	812977.6667	434121.88	12194665	10853047
2	Lime stone	546304	560828.95	34417152	35332224
3	Ilminite	146401.7895	1283489	16689804	26568222
4	Silica sand	45638.00806	88091.64	5659113	12597104
5	Lime shell	63781.14286	43470.97	4018212	2738671
6	Laterite	76859.35955	107683.96	6840483	10445344
7	Zircon	16164.68125	7919.35	20690792	14832938
8	Sillimanite	5988.319444	39.98	1724636	1424332
9	Rutile	10490.44	49.99	8392352	7707021
10	Graphite	327.04	696	18720	45240
11	Quartz	0	3488.37	0	150000

Source: Dept: of Mining&Geology

5.7 Production of Minor Minerals in Kerala 2011-12 & 2012-13

Sl. No.	Minor Mineral	Production in Tonnes		Royalty(Rs)	
		2011-12	2012-13	2011-12	2012-13
1	Granite(building Stone)	13101468.63	15227650.75	209623498	243642412
2	River Sand*	3697269.8	2629390.8	36972698	26293908
3	Ordinary sand	3814079.1	3187035.7	38140791	31870357
4	Laterite	1757764.313	2070631.5	28124229	33130104
5	Brick clay	1588373.4	1515292.5	15883734	15152925
6	Lime shell	9486.54	4804.66	474327	240233
7	Granite(dimension stone)m(in cubic meters)	373.961	1245.11	1495844	4980445

Source: Dept: of Mining&Geology

Revenue from minerals

Government gets revenue from minerals mainly by way of royalty. About 75% of the revenue comes from minor minerals and rest from major minerals. Revenue collected during the year 2012-13 was Rs.49.7 crores. The year wise details of revenue collected during 2011-12 & 2012-13 and district wise details of revenue collected during 2012-13 are given below:

5.8 Revenue collection details 2011-12 & 2012-13

Year	Amount collected for Major Mineral (Rs)	Amount collected for Minor Mineral (Rs)	Total
2011-12	111677683	331311145	442988828
2012-13	123278143	373676894	496955037

Source: Dept: of Mining&Geology

The revenue realization by the department has been impressive and encouraging as is evident from the table given above. As compared to 2011-12 the revenue has increased by around 12 % during 2012-13.

5.9 District-wise Revenue Collection 2012-13

Sl. No.	Districts	Major minerals	Minor minerals	Total
(1)	(2)	(3)	(4)	(5)
1	Thiruvananthapuram	10305958	34264169	44570127
2	Kollam	49409250	35724786	85134036
3	Pathanamthitta	0	26601814	26601814
4	Alappuzha	13585333	2224899	15810232
5	Kottayam	1439550	18168485	19608035
6	Idukki	0	12166576	12166576
7	Eranakulam	195240	58278732	58473972

Sl. No.	Districts	Major minerals	Minor minerals	Total
(1)	(2)	(3)	(4)	(5)
8	Thrissur	0	43853637	43853637
9	Palakkad	35282772	23081040	58363812
10	Malappuram	0	33839562	33839562
11	Kozhikode	0	24929698	24929698
12	Wayanad	0	13473530	13473530
13	Kannur	5546468	26752242	32298710
14	Kasaragod	4717189	10734478	15451667
15	Kerala Mineral squard(SR)	0	1820000	1820000
16	Kerala Mineral squard (NR)	0	3856000	3856000
17	Kerala Mineral squard (CR)		2272000	2272000
18	Directorate	2796383	1635246	4431629
Total		**123278143**	**373676894**	**496955037**

Source: Dept of Mining & geology

5.10 Gem Testing Fee Collection 2012-13

Year	Amount Collected (Rs)
2012-13	445655

Source: Dept of mining & Geology

The mineral concession in force as on 31 st March 2013 with respect to minor minerals is given in Table 3.27.

5.11 Details of Mineral concessions pertaining to Minor Mineral 2012-13

Sl. No.	Type of mineral concession	Number of concessions
1	Quarrying permits	3924
2	Quarrying leases including Dimension stone	585
3	Dealer's License	1460
4	License for registered metal crusher unit	195

Source: Dept of mining & Geology

5.12 Statement showing number of Quarrying permits issued 2011-12 (District wise and Mineral –wise)

Sl. No.	District	Name of Mineral						
		Granite building stone	*Laterite*	*Brick Clay*	Ordinary sand	Sea shell	Lime shell	Total
1	Thiruvanathapuram	158	10	0	7			175
2	Kollam	60	4	5	2			71
3	Pathanamthitta	137	20	3				160
4	Alappuzha		38	4				42
5	Kottayam	240	3	17	151			411
6	Idukki	125			1			126
7	Eranakulam	288	10		11			309
8	Thrissur	126	64	38				228
9	Palakkad	194	46	3	132			375
10	Malappuram	268	429					697
11	Kozhikode	260	106	31	3			400
12	Wayanad	167		4	4			175
13	Kannur	203	571					774
14	Kasaragode	163	342		181			686
	Total	**2389**	**1643**	**105**	**492**			**4629**

Source: Dept of Mining & Geology

5.13 Statement showing number of Quarrying permits issued 2012-13 (District wise and Mineral –wise)

Sl. No	District	Name of Mineral						
		Granite building stone	Laterite	Brick Clay	Ordinary sand	Sea shell	Lime shell	Total
1	Thiruvananthapuram	147	9	2	6	0	-	164
2	Kollam	122	25	4	4	0	-	155
3	Pathanamthitta	90	19	1	2-	-	-	112
4	Alappuzha	-	16	0	-	-	-	16
5	Kottayam	156	3	0	15	-	-	174
6	Idukki	92	0	0	1	-	-	93
7	Eranakulam	243	29	5	12	-	-	289
8	Thrissur	189	47	54	-	-	-	290
9	Palakkad	180	31	3	76	-	-	290
10	Malappuram	266	420	6	-	-	-	692
11	Kozhikode	267	124	25	12	-	-	428
12	Wayanad	289	0	8	29	-	-	326
13	Kannur	179	621	0	0	-	-	800
14	Kasaragode	113	318	0	8	-	-	439
Total		**2333**	**1662**	**108**	**165**	**-**	**-**	4268

Source: Dept of Mining & Geology

5.14 Production details of Major Minerals 2012-13 (In Tonnes)

Minerals	2012-13
China clay	434121.88
Ilmanite	128348.9
Rutile	49.99
Zircon	7919.35
Silimanite	39.98
Silica sand	88091.64
Lime shell/ sea shell	43470.97
Lime stone	560828.95
Bauxite/Laterite	107683.96
Quartz	3488.37
Graphite	696
Brown Ilmanite	50

Source: Dept of mining & Geology

5.15 Production details of Minor Minerals 2012-13

(In Tonnes)

Minerals	2012-13
GBS	15227650.75
GDS	1245.11
Laterite	2070631.5
Lime shell/Sea shell	4804.66
Brick Clay	1515292.5
Ordinary Sand	3187035.7
River sand	2629390.8

Source: Dept of mining & Geology

5.16 Value details of Major Minerals

2012-13 (in Rs.)

Minerals	2012-13
China clay	127197746
Ilmanite	2181933000
Rutile	5860000
Zircon	847370450
Silimanite	378910
Silica sand	162882108
Lime shell/sea shell	47818100
Lime stone	117774080
Bauxite/Laterite	39520028
Quartz	976640
Graphite	376536
Brown Ilmanite	3668000

Source: Dept of mining & Geology

5.17 Value details of Minor Minerals

2012-13

(in Rs.)

Minerals	2012-13
GBS	3806912750
GDS	37353300
Laterite	579776820
Lime shell/Sea shell	5285126
Brick Clay	530352550
Ordinary Sand	4780554000
River sand	3944086500

Source: Dept of mining & Geology

6 IRRIGATION

Water is very important for survival of all forms of life- plant as well as animal Irrigation is an essential input for agriculture and used in all parts of the world where rainfall does not provide enough ground moisture. Irrigation is an artificial application of water to the soil through various systems of tubes, pumps, and sprays. Irrigation is normally used in areas where rainfall is inconsistent or dry conditions or drought is expected. In areas of irregular rainfall, irrigation is used during dry spells to ensure harvests and to increase crop yields. Access to good irrigation allows people to increase their productivity. Irrigation is also an essential input for cultivation for crops like paddy, which require high amount of water to grow. Irrigation is also used to prevent soil consolidation, suppress the growth of weeds in grain fields, and to protect plants against frost .Irrigation is very beneficial to farmers Irrigation reduces the vulnerability of farmers to unpredicted rains and other external shocks, thus enhancing their chances of higher productivity and better incomes. Especially those farmers who own land that are in places that don't get a sufficient amount of water. They use the strategy of irrigation to make up for that deficit and can water their crops to grow them to the full potential. Irrigation means the action of applying water to land in order to supply crops and other plants with necessary water

The rivers in the state provide east potential for irrigation and power generation. Frequent floods and occasional drought condition often affect the crops adversely. The details of area irrigated under various sources like canals, well/tube wells, tanks etc Irrigation development in Kerala is mainly centered on the development of surface water resources mainly on the development of major and medium irrigation projects. With the large population growth expected for the next decades, irrigation must be expanded to increase the food capacity production. It is estimated that 80% of additional food production by the year 2025 will need to come from irrigated land. Even with the widespread measures to conserve water by

improvements in irrigation technology, the construction of more reservoir projects will be required.

Purpose of irrigation

Irrigation is the process of supplying water, in addition to natural precipitation, to field crops, orchards, vineyards, or other cultivated plants. Irrigation water is applied to ensure that the water available in the soil is sufficient to meet crop water needs. The role of irrigation is to improve production and the effectiveness of other inputs. It also play a crucial role in enabling the adoption of green revolution technologies, including modern varieties of rice and wheat and their effects on income, employment, prices, food security and overall growth, are well documented in the development. Irrigation through canals, wells and other sources is considered as a catalyst of economic development of a country. Numerous studies have confirmed on the role of irrigation in increasing crop productivity, intensity of cropping in India since the evolution of planning. However, it also helps in reducing instability in crop production, changes the cropping pattern in favour of high valued crops, and reduces inequality in income among various section farmers in the society.

Major, Medium and Minor Irrigation Projects:

The irrigation projects can be broadly classified into three categories viz major, medium and minor irrigation schemes. Irrigation projects having Cultivable Command Area (CCA) upto 50 ha is treated as MI Class II works. Schemes having an ayacut area between 50 to 2000ha is treated as MI Class I works.

Medium irrigation works are those with irrigable command area of more than 2000 ha, but less than 10,000 ha. Those schemes above 10,000 ha are classified as Major irrigation schemes. For the purpose of analysis the major and the medium irrigation projects are generally grouped together. These projects comprise a network of dams, bunds, canals and other such schemes. Such projects require substantial financial outlay and are, therefore, constructed by the government or any other agency which may draw financial assistance from the government and financial institutions. The minor irrigation projects, on the other hand, comprise all ground water development schemes such as dug wells, private shallow tube wells, deep

public tube wells, and boring and deepening of dug wells and small surface water development works such as storage tanks, lift irrigation projects, etc. Minor irrigation projects or the groundwater development schemes are essentially people's programmes implemented primarily through individual and co-operative efforts with finances obtained mainly through institutional sources.

Irrigation projects in Kerala

There are about twenty completed and seven ongoing major Irrigation projects in Kerala. Some of the completed Irrigation projects in kerala are Neyyar in Thiruvananthapuram district,, Kallada in Kollam district, Pampa in Pathanamthitta district , Periyar valley and Kanakkankadavu in Eranakulam district, Chalakkudy,Chimmoni Mupli, Vazhani, Cheerakuzhy and Peechi in Thrissur district, Malampuzha, Mangalam, Walayar, Gayathri, Pothundy, Kanjirapuzha, Thrithala and chitturpuzha in Palakkad district and finally Kuttiady in Kozhikode district ,Pazhassi in Kannur district.Ongoing project include Edamalayar and Moovattupuzha . At present all irrigation projects in Kerala are owned by government.

6.1 Storage levels in reservoirs of completed projects in Kerala 2012-13

Sl. No.	Name of Reservoir	2012-13
1	Malampuzha	160.83
2	Neyyar	76.29
3	Kallada	198.6
4	Kanhirapuzha	64.12
5	Kuttiyadi	105.61
6	Pothundy	32.65
7	Mangalam	25.34
8	Vazhazni	11.66
9	Peechi	59.06
10	Walayar	6.26
11	Meenkara	6.311
12	Chulliyar	2.72
13	Chimoni	142.58

14	Malankara	34.32
Total		**926.351**

6.2 Irrigation Projects in Kerala

Sl. No.	Name of Project	Districts	Year if Start	Year of completion	Ayacut	In ha.
					Net	Gross
1	Neyyar	Thiruvananthapuram	1951	1973	15380	23480
2	Pampa	Pathanamthitta	1961	1992	21135	49456
3	Periyar Valley	Ernakulam	1956	1994	32800	65600
4	Chalakkudy	Thrissur	1949	1966	19690	39380
5	Vazhani	Thrissur	1951	1962	4226	4647
6	Cheerakuzhy	Thrissur	1957	1973	1620	3240
7	Malampuzha	Palakkad	1949	1966	20553	41106
8	Peechi	Thrissur	1947	1959	18759	28080
9	Mangalam	Palakkad	1953	1966	3440	6616
10	Walayar	Palakkad	1953	1964	3997	6872
11	Gayathri – stage-1	Palakkad	1956	1964	3035	6070
12	Gayathri – stage-2	Palakkad	1961	1970	2430	4860
13	Pothundy	Palakkad	1958	1971	4685	9370
14	Chitturpuzha	Palakkad	1963	1992	15700	29202
15	Kuttiady	Kozhikode	1962	1993	14570	35850
16	Chimoni Mupli	Thrissur	1976	1996	13000	26000
17	Kallada	Kollam	1961	2004	61630	92800
18	Kanjirapuzha	Palakkad	1961	1995	9713	21853
19	Pazhassi	Kannur	1961	1992	11525	23050

Source :IDRB

Irrigation status

The source-wise net area irrigated and gross area irrigated from 2011-12 to 2012-13 are given in Tables 4.3 & 4.5 respectively.Also the district wise details of net irrigated area and gross area irrigated are shown in Table 4.4 . There was a decline in the area under coconut cultivation during the year 2012-13. There was a decline in the area under irrigation for paddy cultivation this year compared to previous year.

6.3 Net Area (in hectares) Irrigated in Kerala – Source Wise 2011-12 &2012-13

(Area in hectare)

Source	2011-12	2012-13
Government Canal	81737	80718
Private Canal	1971	2457
Government Tanks	1724	1275
Private Tanks	45388	42283
Government wells	265	417
Private wells	136928	121921
Minor irrigation	9220	6772
Other sources	106613	113877
Tube wells	25068	26148
Total	**408914**	**395868**

Source: Agri.Statistics, DES

6.4 Net Area (in hectares) Irrigated in Kerala– District wise & Source Wise 2012-13

Area in Hectare

Sl. No.	District	Govt canal	Private canal	Govt tanks	Private tanks	Govt wells	Private wells	Minor irrigation	From River& Lake			Other sources	Total	Tube wells	Grand Total
									Pump	Wheel	Other methods				
1	Thiruvananthapuram	3775		217	7		2674				25	355	380	80	7133
2	Kollam	1129	6	15	66	44	2504	29	19			352	371	48	4212
3	Pathanamthitta	1812	4		199		1876		6			1	7	13	3911
4	Alappuzha	2420			449	5	839		1335		28967	34	30336	6081	40130
5	Kottayam		115		148		1539		33		11061		11094	8	12904
6	Idukki	2502	372	5	13847	4	4486		20		13912	2909	16841	1536	39593
7	Eranakulam	8253	164	306	1315	58	6432	4171	863	18	740	443	2064	421	23184
8	Thrissur	15832	115	258	3363	104	33804	642	663		132	7032	7827	1078	63023
9	Palakkad	37022	128	263	4824	31	14416	530	9726	16	3345	6668	19755	8060	85029
10	Malappuram	3600	263	136	4972	107	15965	866	1006		2073	655	3734	1284	30927
11	Kozhikode	878	176	8	375	16	2444	18	111		118	1006	1235	84	5234
12	Wayanad	69	159		39	8	136	455	156		1183	11245	12584	22	13472
13	Kannur	2922	224	16	1258	25	10576	58	144		211	3243	3598	914	19591
14	Kasaragode	504	731	51	11421	15	24230	3	2965		625	461	4051	6519	47525
Total		**80718**	**2457**	**1275**	**42283**	**417**	**121921**	**6772**	**17047**	**34**	**62392**	**34404**	**113877**	**26148**	**395868**

Source: Agri.Statistics, DES

6.5 Gross Area (in hectares) Irrigated– Crop Wise 2011-12 & 2012-13 (Area in hectare)

Crop	2011-12	2012-13
Paddy	153236	146938
Vegetables	17481	21019
Tubers	15162	619
Coconut	181774	164491
Arecanut	39094	36040
Cloves	289	265
Nutmeg	14960	15468
Other condiments and spices	5234	496
Banana	44190	44336
Betel leaves	330	325
Sugarcane	418	1697
Others	18417	26202

Source: Agri.Statistics, DES

6.6 Gross area under irrigation (crop wise) 2012-13

(Area in hectare)

Sl. No.	Districts	Paddy	Tubers	Vegetables	Coconut	Arecanut	Cloves	Nutmeg	Other spices & condiments	Banana	Betal leaves	Sugarcane	Other crops	Total
1	Thiruvanathapuram	1814	19	997	2228	10		1	29	3358	17		1638	10111
2	Kollam	1106	1	1040	514	22		1		981	27		2359	6051
3	Pathanamthitta	2269		821	867	29				1462	29		34	5511
4	Alappuzha	35477	231	1333	6700	5		82	7	530	54	11	1945	46375
5	Kottayam	17559		1374	58	3	104	1521	1	638	5		15	21278
6	Idukki	1176	2	4265	648	156	107	1377		1028	0	1439	41	10239
7	Eranakulam	3174	60	1825	11833	1566	5	5974	3	3525	9		4035	32009
8	Thrissur	20438	45	1347	44142	4671	6	5829	1	2018	6		3804	82357
9	Palakkad	42022	40	3589	25910	3987	1	187	417	13129	3	246	5834	95365
10	Malappuram	4974	172	1348	19133	5684	2	252	8	5583	149		3336	40641
11	Kozhikode	1478	9	695	2949	305	9	95	3	1643	9		296	7491
12	Wayanad	10228	28	1002	150	176		2	2	7922	0		50	19560
13	Kannur	3503	7	875	13468	2033	2	27	1	2008	1		790	22715
14	Kasaragod	1670	5	508	35891	17393	29	120	24	511	16	1	2025	58193
State Total		**146938**	**619**	**21019**	**164491**	**36040**	**265**	**15468**	**496**	**44336**	**325**	**1697**	**26202**	**457896**

Source: Agri.Statistics, DES

6.7 Distribution of district wise Area irrigated by different sources 2010-11 (Area in hectare)

Sl. No.	District	Canal		Tank		Well		Tube wells		Other sources		Total	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1	Thiruvanantha puram	1168.3	2.26	368.03	0.88	5583.78	4.42	244.71	1.13	2499.61	2.63	9864.43	2.93
2	Kollam	311.75	0.60	58.6	0.14	1669.24	1.32	30.2	0.14	1032.24	1.09	3102.03	0.92
3	Pathanamthitta	1413.04	2.74	51.1	0.12	2244.85	1.78	23.66	0.11	770.95	0.81	4503.6	1.34
4	Alappuzha	1328.78	2.57	789.01	1.88	1941.43	1.54	5062.09	23.39	15017.18	15.82	24138.49	7.17
5	Kottayam	81.61	0.16	720.87	1.72	2901.19	2.30	227.44	1.05	9101.51	9.59	13032.62	3.87
6	Idukki	1344.78	2.60	19063.84	45.37	7866.82	6.23	1135.94	5.25	12190.36	12.84	41601.74	12.36
7	Eranakulam	6318.92	12.23	1610.36	3.83	9706.05	7.69	747.47	3.45	2295.58	2.42	20678.38	6.15
8	Thrissur	8277.89	16.02	2554.51	6.08	25074.19	19.86	873.57	4.04	6258.86	6.59	43039.02	12.79
9	Palakkad	28720.74	55.59	3447.14	8.2	13074.56	10.36	4754.48	21.97	10867.56	11.45	60864.48	18.09
10	Malappuram	1438.23	2.78	4637.81	11.04	20318.96	16.09	1210.84	5.59	7486.63	7.89	35092.47	10.43
11	Kozhikode	516.17	1.00	582.49	1.39	5696.13	4.51	225.89	1.04	1733.82	1.83	8754.5	2.60
12	Wayanad	546.04	1.06	1422.39	3.39	3700.52	2.93	151.23	0.70	19895.79	20.96	25715.97	7.64
13	Kannur	66.06	0.13	1030.66	2.45	10465.83	8.29	522.08	2.41	3243.6	3.42	15328.23	4.56
14	Kasaragode	129.36	0.23	5682.94	13.52	16013.27	12.68	6433.88	29.73	2513.76	2.65	30773.21	9.15
Total		**51661.67**	**100**	**42019.75**	**100**	**126256.8**	**100**	**21643.48**	**100**	**94907.45**	**100**	**336489.2**	**100**

Source: Agri: census 2010-11

Distribution of district wise holdings receiving irrigation by different sources 2010-11

Table 4.8 shows the district wise distribution of holdings receiving irrigation by different sources. The different sources listed are canal, tank, well, tube wells and other sources .Out of the 3918240 irrigated holdings canal irrigated holdings are 172098, tank irrigated holding 111098, well irrigated holdings 2431408, Tube well irrigated holdings are 290997 and other sources irrigated holdings are 912639.

6.8 Distribution of district wise holdings receiving irrigation by different sources 2010-11

Sl. No	District	Canal		Tank		Well		Tube wells		Other sources		Total	
		No	%	No	%	No	%	No	%	No	%	No	%
1	Thiruvanantha puram	6802	3.95	3396	3.06	337015	13.86	9630	3.31	124005	13.59	480848	12.27
2	Kollam	46886	27.24	1562	1.41	115050	4.73	1672	0.57	43372	4.75	208542	5.32
3	Pathanamthitta	5045	2.93	715	0.64	153541	6.31	1235	0.42	16616	1.82	177152	4.52
4	Alappuzha	4830	2.81	18822	16.94	111404	4.58	168136	57.78	65650	7.19	368842	9.41
5	Kottayam	453	0.26	3541	3.19	113173	4.65	4361	1.50	26648	2.92	148176	3.78
6	Idukki	3134	1.82	22618	20.36	58174	2.39	5890	2.02	81570	8.94	171386	4.37
7	Eranakulam	29313	17.03	9375	8.44	192430	7.91	17737	6.10	65969	7.23	314824	8.03
8	Thrissur	24027	13.96	9835	8.85	354484	14.58	5040	1.73	79805	8.74	473191	12.08
9	Palakkad	41630	24.19	9461	8.52	118720	4.88	20026	6.88	136985	15.01	326822	8.34
10	Malappuram	3511	2.04	11366	10.23	290753	11.96	14009	4.81	144701	15.86	464340	11.85
11	Kozhikode	3155	1.83	1828	1.65	200466	8.24	5639	1.94	20754	2.27	231842	5.92
12	Wayanad	1810	1.05	1972	1.78	27904	1.15	1327	0.46	60082	6.58	93095	2.38
13	Kannur	1112	0.65	4147	3.73	224753	9.24	5084	1.75	31379	3.44	266475	6.80
14	Kasaragode	390	0.23	12460	11.22	133541	5.49	31211	10.73	15103	1.65	192705	4.92
Total		**172098**	**100**	**111098**	**100**	**2431408**	**100**	**290997**	**100**	**912639**	**100**	**3918240**	**100**

Source: Agri: census 2010-11

Distribution of district wise number of wells and tube wells

Table 4.9 shows the distribution of district wise number of wells and tube wells.The largest number of wells with pumpset are in Thrissur(247998) district and lowest in Wayanad (19238) district.Wells without pumpset are higher in Thiruvananthapuram (82568).Majority of wells with pumpset is electric connected.Wells with diesel pump set are 30751 in the State.Tube wells are largest in Alappuzha(126061) district.Electric connected tube wells are also largest in Alappuzha district 125343.Diesel connected tube wells are highest in Alapuzha District(718).

6.9 Distribution of district wise number of wells and tube wells 2010-11

Sl. No.	District	Number of wells in use				Number of tube wells		
		With pump set			Without pump sets	Electric	Diesel	Total
		Electric	Diesel	Total				
1	Thiruvananthapuram	153379	1823	155202	82568	5190	193	5383
2	Kollam	96623	1339	97962	49878	1065	184	1249
3	Pathanamthitta	113423	2167	115590	44152	9645	116	9761
4	Alappuzha	72181	2244	74425	53508	125343	718	126061
5	Kottayam	90895	1490	92385	25239	3888	156	4044
6	Idukki	42033	3533	45566	12176	3009	181	3190
7	Eranakulam	182576	1059	183635	19379	15458	196	15654
8	Thrissur	245517	2481	247998	22090	6809	647	7456
9	Palakkad	81529	856	82385	27666	14951	564	15515
10	Malappuram	237694	5278	242972	59514	16932	371	17303
11	Kozhikode	102591	1786	104377	29478	5444	198	5642
12	Wayanad	18748	490	19238	4732	901	107	1008
13	Kannur	80116	2580	82696	26977	4356	152	4508
14	Kasaragode	113349	3625	116974	24870	32679	379	33058
Total		**1630654**	**30751**	**1661405**	**482227**	**245670**	**4162**	**249832**

Source: Agri: census 2010-11

Number of wells and tube wells used for irrigation in different size classes

Table 4 .10 gives the number of wells and tube wells used for irrigation. There are 1661405wells and 249832Tube wells with pump sets and 482227wells without pump set used for irrigation in the state as revealed in the census during 2010-11.Out of the total number of wells used for irrigation are 1630654 are electric connected and 30751 are diesel connected. Tube wells connected with electricity are 245670and diesel tube wells are 4162.

6.10 Number of wells and tube wells used for irrigation in different size classes 2010-11

Sl. No.	Size class	Number of wells in use				Number of tube wells		
		With pump set			Without pump sets	Electric	Diesel	Total
		Electric	Diesel	Total				
1	Marginal Below1.00	1517395	26125	1543520	469243	230527	4081	234608
2	Small (1.00-1.99)	78916	2319	81235	9433	9358	51	9409
3	Semi-medium (2-3.99)	26747	1595	28342	2877	4170	30	4200
4	Medium (4.00-9.99)	6558	407	6965	575	1324	0	1324
5	Large (10.00-&above)	1038	305	1343	99	291	0	291
Total		**1630654**	**30751**	**1661405**	**482227**	**245670**	**4162**	**249832**

Source: Agri: census 2010-11

Intensity of Irrigation (Gross Area concept)

Table 4.11 reveals intensity of irrigation .The intensity of irrigation is measured as a ratio of gross irrigated area and is expressed as percentage. The 9th Agricultural census reveals that the percentage of intensity of irrigation is 121.03 The intensity of irrigation during 2000-01 and 2005-06 is 109.25 and 110.21respectively. The intensity of irrigation shows an increasing trend when compared with the 8th Agricultural census.

6.11 Intensity of Irrigation 2000-01 , 2005-06 & 2010-11

Sl.No	Size class (Hectares)	Intensity of Irrigation (Gross Area concept)		
		200-01	2005-06	2010-11
1	Below 1.00	111.05	111.10	118.01
2	Small (1.00-1.99)	108.53	110.09	115.05
3	Semi-medium (2-3.99)	107.60	109.38	114.79
4	Medium (4.00-9.99)	107.17	107.69	115.44
5	Large (10.00- &above)	102.90	109.34	164.59
All sizes		**109.25**	**110.21**	**121.03**

Source: Agri: census2010-11

Irrigation Status 2000-01, 2005-06 &2010-11

6.12 Percentage of area irrigated from different sources of irrigation by major size groups
2000-01, 2005-06 & 2010-11

Sl.No	Category of holdings Size group	Canal			Tank			Well		
		00-01	05-06	2010-11	00-01	05-06	2010-11	00-01	05-06	2010-11
1	2	3	4	5	6	7	8	9	10	11
1	Marginal (0.02-0.99)	45.92	47.34	44.37	31.64	33.71	32.00	63.42	69.36	68.75
2	Small (1.00-1.99)	24.42	24.06	26.30	19.86	24.44	23.61	18.20	16.64	14.83
3	Semi medium (2.00-3.99)	19.48	17.67	17.37	15.77	19.95	16.35	10.59	9.50	7.31
4	Medium (4.00-9.99)	8.74	8.58	8.65	12.55	11.10	7.86	4.33	3.31	2.74
5	Large (10.00 & above)	1.45	2.35	3.31	20.18	10.8	20.18	3.46	1.19	6.37
All sizes		**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Contd:-

Sl. No	Category of holdings Size group	Tube well			Other sources			All Sources		
		00-01	05-06	2010-11	00-01	05-06	2010-11	00-01	05-06	2010-11
1	2	12	13	14	15	16	17	18	19	20
1	Marginal (0.02-0.99)	54.79	49.20	58.21	45.91	32.63	39.56	51.97	48.27	51.50
2	Small (1.00-1.99)	15.43	17.30	19.37	22.60	19.97	20.70	20.37	19.80	19.64
3	Semi medium (2.00-3.99)	12.61	17.96	13.45	15.79	17.55	13.53	14.11	15.17	12.13
4	Medium (4.00-9.99)	8.19	12.05	6.06	7.96	9.99	6.40	7.15	7.80	5.53
5	Large (10.00 & above)	8.98	3.49	2.91	7.73	19.86	19.81	6.39	8.96	11.20
All sizes		**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source :AgriculturalCensus 2010-11

The above table shows the various percentages of source wise and size class wise irrigation during 7th, 8th and 9th census. Analysing the sources of irrigation to different classes compared with the result of previous census the percentage of irrigated area is higher in marginal followed by small, semi-medium, medium from all sources, viz Canal, Tank, Well, Tube well and other sources.This characteristic is same during the earlier census results also .Among the various sources, well and tube well is highest in marginal size class.

7. GROUND WATER

Richly endowed with natural resources, the tiny State of Kerala receives average annual rainfall of about 3000 mm.It also boasts of abundant fresh water resources including 44 rivers besides a large number of ponds and water bodies. The State also has a large number of large diameter open wells for extraction of ground water for various uses. Groundwater is water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations. Ground water is recharged from, and eventually flows to, the surface naturally; natural discharge often occurs at springs and seeps and can form oasis or wetlands. However, in spite of the apparent riches, water scarcity is becoming common places in parts of the state, especially during summer months. Increasing population, rapid urbanization and industrialization has results in increasing use of ground water resources over the last few decades in the State. Judicious and planned development of ground water and its scientific management have become necessary to ensure long term sustainability of this precious natural resource in Kerala. This requires realistic estimate of the availability of ground water resources and the current status of its utilization. Ground water has traditionally been and still continues to be one of the preferred sources of fresh water for various uses in Kerala. With nearly 90 percent of the total geographical area underlain by massive hard rocks, the ground water development prospects of the State are very limited. Increasing demand of fresh water resources to satisfy the requirements of an increasing population has been putting these limited resources under increasing stress in recent decades. Changing life styles, increasing urbanization and consequent reduction in the recharge into the ground water reservoirs have also made significant contributions to the depletion of ground water resources of the State. Contamination of ground water resources from natural and anthropogenic sources is also emerging as a major threat to the sustainability of ground water sources in many areas. Groundwater contains information on rainfall performance, water flowing streams and ground water resources, water quality criteria and distribution of water monitoring stations. The occurrence and availability of ground water vary considerably from place to place within the state depending on the prevailing climatic, geomorphological and hydro geological conditions.

7.1 Ground Water Monitoring Wells in Kerala 2012-13

Sl.No	District	No.of GWMW		
		Dug Wells	Piezometers	Total
1	Thiruvananthapuram	31	42	73
2	Kollam	25	30	55
3	Pathanamthitta	19	30	49
4	Alappuzha	27	40	67
5	Kottayam	24	32	56
6	Idukki	20	27	47
7	Eranankulam	43	25	68
8	Thrissur	28	37	65
9	Palakkad	40	43	83
10	Malappuram	35	30	65
11	Kozhikode	20	28	48
12	Wayanad	37	19	56
13	Kannur	41	28	69
14	Kasaragode	53	21	74
Total		443	432	875

Source: GWD

Total Annual Ground Water Recharge

The Total Annual Ground Water Availability in Kerala State has been computed as 6.686 Billion Cubic Metre (BCM).Rainfall recharge accounts for about 82 percent of the annual recharge, with the remainder contributed by other sources. The contribution of districts to the total annual recharge of the State is as shown below in Table 4.14. Also the Net Ground Water Availability for the entire State is 6.073 billion cubic metre (BCM). The district wise availability in theState ranges from196.55 MCM in Idukki district to 783.83MCM in Palakkad district.

Net Ground Water Availability for future Irrigation Development

The availability of ground water resources for future development has been computed as the difference between the net annual ground water resource available and the annual ground water draft for all purposes. The Net Ground Water Availability for future Irrigation Development in the State as in 2011 is of the order of 3.065 BCM. The district wise net ground water availability ranges from 83.87 MCM in Kasaragode district to 327.22 MCM in Eranakulam district. District wise status of Net Ground Water Availability and Annual Ground Water Draft for all uses is shown below Table 4.15.

7.2 Annual Ground water Recharge 2011-12

Sl. No	Districts	Recharge from rainfall during monsoon season (MCM)	Recharge from other sources during monsoon season (MCM)	Recharge from rainfall during non-monsoon season (MCM)	Recharge from other sources during non-monsoon season (MCM)	Total Annual Ground Water Recharge (MCM)	Provision for Natural Discharges (MCM)	Net Annual Ground water Availability (MCM)
1	Alappuzha	304.07	0.70	73.00	108.69	486.46	33.56	452.90
2	Eranakulam	424.96	4.83	79.42	135.78	644.99	61.73	583.27
3	Idukki	162.33	1.10	31.19	23.76	218.38	21.84	196.55
4	Kannur	452.96	6.79	0.00	72.56	532.32	52.19	480.13
5	Kasaragode	310.39	8.15	0.00	46.90	365.44	36.54	328.89
6	Kollam	319.65	1.66	104.52	41.72	467.56	45.35	422.21
7	Kottayam	347.80	1.33	73.31	69.39	491.82	46.12	445.70
8	Kozhikode	362.27	2.29	0.00	14.47	379.04	34.42	344.62
9	Malappuram	400.81	3.60	55.90	85.00	545.31	49.76	495.55
10	Palakkad	455.01	17.42	77.69	308.02	858.14	74.32	783.83
11	Pathanamthitta	182.08	1.23	61.26	34.61	279.18	26.16	253.02
12	Thiruvananthapuram	248.92	2.85	74.39	29.81	355.96	27.24	328.71
13	Thrissur	571.51	10.72	0.00	172.82	755.05	73.52	681.53
14	Wayanad	304.07	0.21	0.00	2.46	306.75	30.67	276.07
Total		**4846.83**	**62.88**	**630.68**	**1145.99**	**6686.40**	**613.42**	**6072.98**
Total in BCM		**4.847**	**0.063**	**0.631**	**1.146**	**6.686**	**0.613**	**6.073**

Source: GW Dept

7.3 Dynamic Ground Water Resources of Kerala 2011-12

Sl. No.	Districts	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for irrigation	Existing Gross Ground Water Draft for domestic and industrial water supply	Existing Gross Ground Water Draft for all uses	Provision for domestic, and industrial requirement supply up to 2025	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development (%)
1	Alappuzha	452.90	29.92	100.40	130.32	103.72	319.27	28.78
2	Eranakulam	583.27	103.08	139.31	242.40	152.96	327.22	41.56
3	Idukki	196.55	28.74	54.96	83.70	59.85	107.96	42.58
4	Kannur	480.13	109.43	109.39	218.82	119.32	251.37	45.58
5	Kasaragode	328.89	167.05	67.75	234.80	77.98	83.87	71.39
6	Kollam	422.21	40.15	119.33	159.48	130.16	251.90	37.77
7	Kottayam	445.70	34.91	92.14	127.05	107.04	303.75	28.51
8	Kozhikode	344.62	52.00	140.24	192.24	157.93	134.69	55.78
9	Malappuram	495.55	81.66	202.35	284.01	243.92	169.96	57.31
10	Palakkad	783.83	354.94	131.51	486.46	141.97	288.94	62.06
11	Pathanamthitta	253.02	34.63	60.04	94.67	63.04	155.34	37.42
12	Thiruvananthapuram	328.71	39.85	133.16	173.01	146.99	141.87	52.63
13	Thrissur	681.53	221.67	137.20	358.88	152.16	307.69	52.66
14	Wayanad	276.07	6.52	43.19	49.71	48.16	221.39	18.01
Total in MCM		**6072.98**	**1304.55**	**1530.97**	**2835.55**	**1705.20**	**3065.22**	**46.69**
Total in BCM		**6.073**	**1.305**	**1.531**	**2.836**	**1.705**	**3.065**	**46.69**

Source: GW Dept

7.4 Variation in Major components of Dynamic Ground Water Resources of Kerala 2009-10,2010-11 & 2011-12

Sl. No.	Districts	Net Annual Ground Water Availability (MCM)		Existing Gross Ground Water Draft for all use (MCM)		Net Ground Water Availability for future irrigation development (MCM)		Stage of Ground Water Development (%)	
		2009	2011	2009	2011	2009	2011	2009	2011
1	*Alappuzha*	453.65	452.90	129.35	130.32	320.02	319.27	28.51	28.78
2	Eranakulam	557.35	583.27	239.76	242.40	301.72	327.22	43.02	41.56
3	Idukki	196.55	196.55	82.98	83.70	107.96	107.96	42.22	42.58
4	Kannur	479.11	480.13	217.39	218.82	250.35	251.37	45.97	45.58
5	Kasaragode	327.24	328.89	233.33	234.80	82.21	83.87	71.30	71.39
6	Kollam	409.27	422.21	157.11	159.48	238.10	251.90	38.39	37.77
7	Kottayam	473.16	445.70	125.97	127.05	331.21	303.75	26.62	28.51
8	Kozhikode	347.38	344.62	189.72	192.24	137.45	134.69	54.61	55.78
9	Malappuram	484.31	495.55	279.51	284.01	158.72	169.96	57.71	57.31
10	Palakkad	795.25	783.83	484.17	486.46	300.42	288.94	60.88	62.06
11	Pathanamthitta	284.11	253.02	94.24	94.67	186.44	155.34	33.17	37.42
12	Thiruvananthapuram	304.74	328.71	171.01	173.01	117.90	141.87	56.12	52.63
13	Thrissur	640.60	681.53	356.73	358.88	266.76	307.69	55.69	52.66
14	Wayanad	276.28	276.07	47.68	49.71	221.60	221.39	17.26	18.01
	Total in MCM	**6028.99**	**6072.98**	**2808.95**	**2835.55**	**3020.87**	**3065.22**	**46.62**	**46.69**
Difference in comparison with 2009(%)		**+0.73**		**+0.95**		**+1.47**		**+0.002**	

Source: GW Dept

A comparison of the major components of the dynamic ground water resources of Kerala as in 2011 with those in 2009 is as shown above. The data provided in the table indicate that the net annual ground water availability for the State of Kerala during 2011 has increased by 0.73 % when compared with the corresponding figures during 2009.The annual ground water draft for all uses has increased by 0.95% during the period. The net ground water availability for future irrigation development in the State as a whole shows a increased of 1.47% in 2011 when compared to the corresponding figures in 2009.The stage of ground water development in the State shows a increase from 46.62 % during 2009 to 46.69 % during 2011,registering a marginal increase. It is observed that the variations in the major components of dynamic ground water resources of Kerala as computed in 2009 and 2011 vary from district to district.

Additional Annual Potential Recharge

The availability of ground water resources to be used as potential recharge has been computed for shallow water table areas of the State. The potential Recharge thus calculated for Kerala as a whole is of the order of 491.86 MCM. Details of district wise computations of potential recharge are as shown below:

7.5 Additional Annual Potential Recharge under specific conditions in Kerala 2011-12

Districts	Potential Recharge in water logged and shallow water table area	Potential Recharge in flood prone area	Total Annual Additional Potential Ground Water Recharge
	2011	2011	2011
Alappuzha	39802.69	0.00	39802.69
Eranakulam	7584.77	0.00	7584.77
Kasaragode	108.88	0.00	108.88
Kollam	1624.19	0.00	1624.19
Kottayam	13.38	0.00	13.38
Kozhikode	7.50	0.00	7.50
Palakkad	33.83	0.00	33.83
Thrissur	11.20	0.00	11.20
Total	49186.43	0.00	49186.43
Total in MCM	**491.86**	**0.00**	**491.86**

Source: GW Dept

8. STORAGE

The idea of Food Management has been introduced with the basic objectives of distribution of food to the needy sections of the society at affordable prices. This concept also focuses on the integrated national food which aim at maintaining a buffer stock which is created by purchasing supplies in surplus areas to counter the factors of local or seasonal variations in demand and supply, to provide a price support to the farmers on harvesting and also to put a check on unethical activities of hoarders and profiteers as these activities may cause violent fluctuations in the prices of food grains.

Storage of goods is of vital importance not only in the agriculture sector but also in the industrial sector. In the primary sector that is agriculture, storage is necessary at the farm and fields level; in the secondary sector that is industry, storage is essential at the processing and manufacturing level and in the tertiary level it is inevitable for the domestic, import and export trade. The necessity for storage arises primarily because of lack of adjustment between the time and place of production of goods and time and place of their consumption.

Warehouses play a vital role in the flow of goods from producers to consumers. It helps in combating annual and seasonal fluctuation in production and prices. Provision of facilities for food grains comes under the purview of Department of Food and Public Distribution. There are three agencies in the public sector which are engaged in building large scale storage/ warehousing capacity- Food Corporation of India (FCI), Central Warehousing Corporation (CWC) and 17 State Warehousing Corporations (SWCs).In addition to food grains, storage also includes industrial warehousing, custom-bounded Warehouses, container freight stations, inland clearance depots and air cargo complexes.

The Central Government, through FCI, has the responsibility for procurement, storage, transportation and bulk allocation of food grains to the States. The State Government has the responsibility of making area wise allocations within the State, identification of BPL/APL families, and issue of categorized ration cards and finally

distribution of food grains to the rationed families in a simple and rational manner through the Public Distribution System network across the country.

Kerala, being a deficit State, FCI undertakes the major role of providing scientific storage of food grains in the State thereby ensuring adequate stocks for timely distribution under GOI schemes and also in facilitating adequate buffer stocks for the State's requirement. In order to provide easy physical access in deficit, remote and inaccessible areas, the FCI has a network of storage depots strategically located all over India. These depots include silos, go downs and an indigenous method developed by FCI, called Cover and Plinth (CAP).

In the State the FCI is having 23 owned go downs with a total covered storage capacity of 5.19 Lakh Metric Tonne.This storage capacity ensures 3 months of buffer storage for state's TPDS requirement. In addition, FCI also has a CAP storage capacity of 20870 MT which is not put to use due to torrential rainfall in the state.

The Food Corporation of India was setup under the Food Corporation Act 1964, in order to fulfill following objectives of the Food Policy:

- Effective price support operations for safeguarding the interests of the farmers.
- Distribution of food grains throughout the country for public distribution system.
- Maintaining satisfactory level of operational and buffer stocks of food grains to ensure National Food Security.

Since its inception, FCI has played a significant role in India's success in transforming the crisis management oriented food security into a stable security system.

8.1 Storage capacities with FCI in the state
2012-13

Sl. No	Revenue District	FCI District	Depot	Capacity in MT	
				covered	open
1	Thiruvananthapuram	Thiruvananthapuram	Valiathura	33440	2250
			Kazhakutham	36136	0
2	Kollam	Kollam	Kollam	11900	0
			Karunagapally	30000	0
			Avaneeswaram	9200	0
			Kilikollur	5000	1200
3	Pathanamthitta		No FCI Godown	Requirement is met from FSDs mavelikkara & Avaneeswaram	
4	Alappuzha	Alappuzha	Alleppey	10000	0
			Mavelikkara	20000	5000
5	Kottayam	Kottayam	Chingavanm	15320	0
6	Idukki		Arakkulam	5000	0
7	Eranakulam	Kochi	Kochi	18700	0
			Angamally	40000	0
8	Thrissur	Trichur	M.G.Kavu	48960	5750
			Chalakudy	10000	1670
9	Palakkad	Palakkad	Palakkad	70740	5000
10	Malappuram		Angadipuram	10000	0
11	Calicut	Calicut	Kuttipuram	5000	0
			West Hill	35160	0
			Thikkodi	45000	0
12	Wayanad		Meenangadi	5000	0
13	Kannur	Kannur	Muzhapilangad	10640	0
			Payyannur	29000	0
14	Kasaragode		Neeleswaram	9500	0
PEG-CW Kunnamthanam (under D.O.Kottayam)				5000	0
TOTAL				**518696**	**20870**

Source: FCI

8.2 Storage Capacity with FCI 2006 to 2013

Capacity	1st April 2006	1st April 2007	1st April 2008	1st April 2009	1st April 2010	1st April 2011	1st April 2012	1st April 2013
Covered								
Owned	12.93	12.94	12.95	12.97	12.97	12.99	13.01	13.00
Hired	09.90	09.34	08.71	10.12	12.89	15.46	17.21	20.99
Total	**22.83**	**22.28**	**21.66**	**23.09**	**25.86**	**28.45**	**30.22**	**33.99**
CAP(cover and Plinth)								
Owned	2.21	2.29	2.20	2.17	2.51	2.62	2.63	2.64
Hired	0.51	0.63	0.03	0.02	0.47	0.54	0.75	1.10
Total	**2.72**	**2.92**	**2.23**	**2.19**	**2.98**	**3.16**	**3.38**	**3.74**
Grand Total	**25.55**	**25.20**	**23.89**	**25.28**	**28.84**	**31.61**	**33.60**	**37.73**

(Figure in million tones)
Source: FCI

8.3 Storage capacity available with the State Government is as follows

Capacity in MT

Sl.No	State Agency	Owned	Hired	Total
1	SWC	Nil	Ni	Nil
2	Kerala State Civil Supplies Corporation Ltd.	Nil	Nil	Nil
3	Marketfed	Nil	Nil	Nil
TOTAL		**Nil**	**Nil**	**Nil**

Source: FCI

8.4 District wise Food grain storage capacity, cold storages, warehouses and container Depots : 2012-13

Sl.No	District	Food Grain storage (in tones)	Cold storage (in number)	Warehouses (in numbers)	Container Depots (in number)
1	Thiruvananthapuram	3080	Nil	5	Nil
2	Kollam	1000	Nil	4	Nil
3	Pathanamthitta	2000	Nil	4	Nil
4	Alappuzha	2100	Nil	6	Nil
5	Kottayam	1400	Nil	5	Nil
6	Idukki	1500	Nil	3	Nil
7	Ernakulam	850	Nil	4	1
8	Thrissur	1550	Nil	4	Nil
9	Palakkad	6350	Nil	4	Nil
10	Malappuram	2500	Nil	3	Nil
11	Kozhikode	Nil	Nil	2	Nil
12	Wyanad	1100	Nil	3	Nil
13	Kannur	2500	Nil	4	Nil
14	Kasaragod	2500	Nil	5	Nil
Total		**28430**	**Nil**	**56**	**1**

Source: Kerala State Warehousing Corporation

9. PUBLIC DISTRIBUTION SYSTEM

Food, drinking water, education and shelter are required to be provided to poor and weaker sections of the society for their upliftment. The changes in prices affect purchasing power and thereby the living conditions of the people. Food being the most important of all, availablity of selected food grains at the reasonable price to poor is the prime responsibility of the Government. The State Government has ensured the availability of food grains by opening sufficient number of Fair Price Shops (FPS) across the State, with the main objective of providing food grains at cheaper and subsidized rates to the poor. The responsibility of Public Distribution System (PDS) is shared by the Central as well as the State Government. Required allocation of food grains to the States is fulfilled by the Central Government, whereas the identification of needy families and allocation of food grains to them is the responsibility of the State Government. The main commodities covered under PDS are Wheat, Rice, Sugar and Kerosene. Public distribution system is very relevant for the State, where there is more than 75% deficit in food grain production. Only 15% of the food grains required are produced here and the rest is met from other states like Tamilnadu, Andhra Pradesh, Madhya Pradesh etc.The Public Distribution system is an instrument for ensuring the availability of certain essential commodities for consumption at subsidized rates to the people, particularly the poor.

9.1 Public distribution system of essential commodities 2011-12 &2012-13

Item		2011-12	2012-13
Number of ration cards for families		7863698	8100536
No. of Ration permits		6311	6311
No. of FCI Depot		22	22
No. of wholesale shops	Co-operatives	35	36
	Supply Co	9	10
	Others	288	287
	Total	**332**	**333**
Number of Retail shops	Co-operatives	413	411
	Others	13854	13890
	Total	**14267**	**14301**

Source: Economic Review

9.2 Allotment of sugar and kerosene from 2011-12 to2012- 2013

Year	Sugar allotment MT	Kerosene allotment KL
2011-12	62855	197124
2012-13	58076	125196

Source: Economic Review

10.Drinking Water Supply and Sanitation

Water is the edifice of all activities. Safe drinking water and its supply and proper sanitation are the basic necessities of life. Demand for water is increasing due to multitude of human activities in the country. Govt. of India as well as State Govt are committed to provide safe drinking water facilities and total sanitation to all The primary responsibility of providing drinking water facilities in the country rests with the respective state Governments, though the Centre formulates policies and guidelines for the sector, and supplements the efforts of State Governments by providing technical and financial assistance under various centrally sponsored schemes. The state of Kerala is no exception to it. Provision of safe drinking water not only reduces the risk of death due to water born diseases, but safe drinking water along with proper sanitation also helps in maintaining and determining the quality of life.

The problem, however is that with the growth of human population, there is a growing concern for adequacy of fresh water. Now access to safe drinking water remains an urgent need. Drinking water scarcity has been experienced in many parts of the state on an unprecedented scale. There is an imminent need to create greater social awareness about the rights and responsibilities in the use of water and to put in place better management practices in the utilization of this invaluable resource.

Coverage of water supply in Kerala

Our State has also initiated a number of programmes for giving safer drinking water and hygienic environment to its people on area specific basis in both Rural and Urban areas. As on 31.03.2013, the coverage of drinking water supply in Kerala was 79.12 percent of total population. In urban and rural areas of the state, 85.18 percent and 77.00 percent of the population were covered. The total number of urban and rural people covered by water supply schemes in Kerala was 70.41 lakh and 181.51 lakh respectively.

During 2012-13 Eranakulum District had the highest rural water supply coverage (98.26%) and Kozhikode district had the lowest coverage (42.75%).In urban area, Malappuram District had the highest coverage (99.35%) and Wayanad District had the lowest coverage with 50.10 percent. In the case of total population covered, Eranakulum district had the highest coverage (97.41%) and Kozhikode District had the lowest coverage (55.25%) during 2012.-13. The district wise details of population covered by Water Supply Schemes as on 31/03/2013 is given below:

10.1 District-wise population covered by Water Supply Schemes 2012-13

Sl.No	District	Rural popul-ation covered	% to Total Rural popul-ation	Urban popul-ation covered	% to Total Urban popul-ation	Total popul-ation covered	% to Total popul-ation
1	Thiruvanantha puram	1873648	87.44	958617	87.81	2832265	87.57
2	Kollam	1590377	75.05	453781	97.38	2044158	79.07
3	Pathanam thitta	888473	80.03	107700	87.00	996173	80.73
4	Alappuzha	1202805	80.85	528255	85.00	1731060	82.07
5	Kottayam	1197584	72.41	292663	97.62	1490247	76.28
6	Idukki	687801	64.18	55262	95.95	743063	65.80
7	Ernakulam	1600350	98.26	1425000	96.47	3025350	97.41
8	Thrissur	1928376	90.33	828354	98.68	2756730	92.62
9	Palakkad	1583342	70.03	340964	95.62	1924306	73.52
10	Malappuram	2107224	64.45	353860	99.35	2461084	67.88
11	Kozhikode	760044	42.75	830762	75.44	1590806	55.25
12	Wayanad	694217	92.44	14835	50.10	709052	90.83
13	Kannur	1167377	97.60	708332	58.40	1875709	77.86
14	Kasaragod	869925	89.65	143298	61.32	1013223	84.15
	Total	**18151543**	**77.00**	**7041683**	**85.18**	**25193226**	**79.12**

Source :KWA

Kerala Water Authority

Various schemes are being implemented by Kerala Water Authority considering the need for extending the coverage of protected water supply in the state adopting scientific distribution and conservation such as Centrally Sponsored National Rural Drinking Water Programme (NRDWP) and Urban Water Supply schemes, Technology Mission Schemes, Swajaldhara schemes, schemes with loan assistance from NABARD/Banks, externally aided JBIC projects (now JICA) and ADB and World Bank assisted schemes. State funded water supply schemes are also being undertaken by Kerala Water Authority.

As on 31/03/2012, there are 2188 water supply schemes operating under Kerala Water Authority. Out of which 71 are urban schemes, 985 Multi panchayat and 1132 Single panchayat Schemes. Under urban water supply schemes Ernakulum (14 schemes) and Thrissur (12 schemes) have more schemes. As in the case of Multi panchayat schemes, Thrissur is in first position having 147 followed by palakkad (133 schemes) and Kozhikode (118 schemes).For Single panchayat scheme Wayanad has only 32 schemes.

As on 31/03/2013, there are 2208 water supply schemes operating under Kerala Water Authority. Out of which 72 are urban schemes, 996 Multi panchayat and 1140 Single panchayat Schemes. Under urban water supply schemes Eranakulum (14 schemes) and Thrissur (12 schemes) have more schemes. As in the case of Multi panchayat schemes, Thrissur is in first position having 147 followed by Palakkad (133 schemes) and Kozhikode (118 schemes).For Single panchayat scheme, Wayanad has only 33 schemes.

Details are given in the Table below:

10.2 District and Category-wise Water Supply Schemes-KWA in operation 2011-12

Sl. No	District	No. of Urban Water Supply Schemes	Rural Water Supply Schemes-		Total
			Multi panchayat	Single panchayat	
1	Thiruvananthapuram	6	45	95	146
2	Kollam	3	38	65	106
3	Pathanamthitta	3	19	50	72
4	Alappuzha	7	2	77	86
5	Kottayam	5	55	97	157
6	Idukki	1	106	92	199
7	Eranakulam	14	63	91	168
8	Thrissur	12	147	104	263
9	Palakkad	4	133	51	188
10	Malappuram	5	113	43	161
11	Kozhikkode	2	118	128	248
12	Wayanad	0	30	32	62
13	Kannur	6	52	120	178
14	Kasaragode	3	64	87	154
	Total	**71**	**985**	**1132**	**2188**

Source:Kerala Water Authority

10.3 District and Category-wise Water Supply Schemes in operation 2012-13

Sl.No	District	No. of Urban Water Supply Schemes	Rural Water Supply Schemes-		Total
			Multi panchayat	Single panchayat	
1	Thiruvananthapuram	6	46	96	148
2	Kollam	3	39	66	108
3	Pathanamthitta	3	21	50	74
4	Alappuzha	7	2	77	86
5	Kottayam	6	60	97	163
6	Idukki	1	106	93	200
7	Eranakulam	14	64	91	169
8	Thrissur	12	147	104	263
9	Palakkad	4	133	51	188
10	Malappuram	5	113	46	164
11	Kozhikkode	2	118	129	249
12	Wayanad	0	30	33	63
13	Kannur	6	53	120	179
14	Kasaragode	3	64	87	154
	Total	**72**	**996**	**1140**	**2208**

Source: Kerala Water Authority

10.4 District-wise details of water supply connections and street taps 2011-12

Sl. No	District	Water supply connection				Street taps		
		Domestic	Non-Domestic	Industrial	Total	Panchayat	Corp/ /Mun	TOTAL
1	Thiruvananthapuram	264638	38085	110	302833	11756	5190	16946
2	Kollam	102655	9115	195	111965	16016	4757	20773
3	Pathanamthitta	29934	2622	24	32580	6286	1037	7323
4	Alappuzha	82016	3176	97	85289	20509	4441	24950
5	Kottayam	89598	6191	54	95843	13143	2079	15222
6	Idukki	19992	1794	4	21790	3510	536	4046
7	Eranakulam	351882	20888	241	373011	31535	10140	41675
8	Thrissur	118967	4497	40	123504	23205	5482	28687
9	Palakkad	91802	5809	142	97753	13065	3377	16442
10	Malappuram	52290	3409	7	55706	7190	2403	9593
11	Kozhikode	54515	4043	29	58587	4460	3458	7918
12	Wayanad	10719	1068	3	11790	3988	265	4253
13	Kannur	30095	3611	69	33775	5102	1605	6707
14	Kasaragod	15421	905	10	16336	3115	539	3654
	TOTAL	**1314524**	**105213**	**1025**	**1420762**	**162880**	**45309**	**208189**

Source: Kerala Water Authority

10.5 District-wise details of water supply connections and street taps 2012-13

Sl. No	District	Water supply connection				Street taps		
		Domestic	Non-Domestic	Industrial	Total	Panchayat	Corp/ Mun	TOTAL
1	Thiruvananthapuram	283165	41816	135	325116	12288	5445	17733
2	Kollam	112626	5912	196	118734	14531	4765	19296
3	Pathanamthitta	32621	2785	26	35432	10276	1037	11313
4	Alappuzha	96498	3352	110	99960	22588	4385	26973
5	Kottayam	92577	6356	54	98987	7599	2141	9740
6	Idukki	21005	1897	6	22908	3369	536	3905
7	Eranakulam	374751	21739	268	396758	29982	9877	39859
8	Thrissur	125259	4709	41	130009	21864	5400	27264
9	Palakkad	97985	6064	141	104190	14089	3182	17271
10	Malappuram	55919	3584	7	59510	7052	2334	9386
11	Kozhikode	56354	4101	30	60485	4436	3522	7958
12	Wayanad	11482	1177	3	12662	3844	218	4062
13	Kannur	31669	3723	67	35459	5582	1632	7214
14	Kasaragod	15867	970	10	16847	2915	556	3471
	TOTAL	**1407778**	**108185**	**1094**	**1517057**	**160415**	**45030**	**205445**

Source: Kerala Water Authority

Receipt of Kerala Water Authority

Major financial source of Kerala Water Authority includes revenue from water charges and sewerage, Plan and Non-Plan allocation from state Government, Deposit from Local Bodies, Fund from Govt. of Indiaand loan fromLIC/ HUDCO. Details of revenue receipts of KWA are given below.

10.6 Receipts of Kerala Water Authority from various sources from 2011-12 & 2012-13

(Rs.In Lakh)

Year	Revenue from Water/ Sewerage rates	State Govt		Deposits from local bodies	Govt of India	Loan from LIC/ HUDCO	others	Total
		Plan	Non-Plan					
2011-12	35335.08	46825.74	19152.16	1260.00	12446.43	77.52	1922.16	117019.09
2012-13	35800.20	57554.75	22865.04	5531.37	24903.58	77.77	3217.14	149949.85

Source: Kerala Water Authority

10.7 District Wise & Category wise number of ongoing water supply schemes 2012-13

Name of District	Number of ongoing Water Supply Schemes																	
	Rural water Supply Schemes											Urban Water Supply Schemes						Total
	ARWSS	NC/PC	Technology Mission	TRPschemes funded by GOI	State plan	SAARK(2010-2011)	New Water Schemes (2010-2011)	NABARD	Externally Assisted(JICA)	Deposit works of KWA (For Schemes of local bodies /other agencies)	SAARK(2009-10)	Completion of ongoing UWSS - Special Package	Externally Assisted (JICA)	JNNURM	SPARK (2009-10) Replacement of old pipes	UIDSSMT	Bank	
Thiruvananthapuram	15	-			3			3		196	1	2	1	1				222
Kollam	10	1			1			1	1	35								49
Pathanamthitta	15	11			1			1		108						1		137
Alappuzha	6	11	2		2			-	1	76						1		99
Kottayam	21	1			8			-		48	1					1		80
Idukki	21	-						1		11								33
Eranakulam	11	3			1			3		210		2		1				231
Thrissur	5	1	2		1	1		3		147		6				2		168
Palakkad	8	4	1					3		41		2				2		61
Malappuram	19	3			1	3		2		108					1	2		139
Kozhikode	15	29	1		1			1		53			1		2	1		104
Wayanad	3	-						-		43						1		47
Kannur	7	4		1	1	1		-	1	44		3			2	2		66
Kasargod	6	-						-		26		1			1			34
Total	**162**	**68**	**6**	**1**	**20**	**5**	**0**	**18**	**3**	**1146**	**2**	**16**	**2**	**2**	**6**	**13**	**0**	**1470**

10.8 Plan & Non Plan Expenditure of Kerala Water Authority 2011-12 & 2012-13

(Rs. In Lakhs)

Items	2011-12	2012-13
Plan Expenditure		
State Plan Schemes	25983.99	34867.63
LIC/HUDCO	0.00	0.00
Externally Assisted	19307.00	26438.28
Centrally Assisted	2375.13	4334.98
Others (if any)	0.00	0.00
Total	**47666.12**	**65640.89**
Non Plan Expenditure		
Salary & Establishment	37247.78	41984.15
Power charge	14788.00	19400.00
Operation & Maintenance	7489.99	7500.00
Interest on Loans	3703.87	3132.83
(excluding GOK)		
Repayment of Loans	5039.66	11407.92
(excluding GOK)		
Others	850.00	900.00
Total	**69119.30**	**84324.90**
Grand Total	**116785.42**	**149965.8**

Source: Kerala Water Authority

10.9 District wise distribution of KWA Water Supply Schemes Transferred to Local Bodies 2010-11

Sl.No	District	No.of Schemes(Rural)		Total	Population coverage
		From the list of 1050 schemes	From other than the list of 1050 schemes		
1	Thiruvananthapuram	2	0	2	33667
2	Kollam	2	0	2	3950
3	Pathanamthitta	0	0	0	0
4	Alappuzha	0	0	0	0
5	Idukki	3	1	4	2710
6	Kottayam	9	0	9	32400
7	Thrissur	19	22	41	57640
8	Eranakulam	1	0	1	1500
9	Palakkad	69	51	120	434300
10	Malappuram	45	56	101	264643
11	Kozhikkode	49	65	114	142315
12	Wayanad	10	1	11	42445
13	Kannur	6	2	8	4800
14	Kasaragode	14	25	39	28700
	Total	**229**	**223**	**452**	**1049070**

Source: KWA

10.10 Income from water charges 2011-12 & 2012-13

(Rs in Lakhs)

Year	Urban schemes			Rural comprehensive schemes			Rural single panchayat scheme			Total		
	Domestic/ non domestic & Industrial	Street taps	Total	Domestic/ non domestic & Industrial	Street taps	Total	Domestic/ non domestic & Industrial	Street taps	Total	Domestic/ non domestic & (Industrial)	Street taps	Total
2011-12	15789	2487	18276	3947	1838	5785	1974	1595	3569	21710	5920	27630
2012-13	16868	4356	21224	4217	4958	9175	2343	8038	10381	23428	12394	35822

Source: Kerala Water Authority

Jalanidhi Project

Kerala Rural Water Supply and Sanitation Agency (KRWSA) was set up, under the aegis of the World Bank, in November 1999 as an autonomous body functions under the Dept of Water Resources, Got of Kerala. The primary aim of this agency is to facilitate and support year-round supply of adequate quantities of potable water to the rural Kerala, through the active participation of the user group themselves. The advances made by the Peoples' planning programme in Kerala and successful decentralization has made participatory planning a feasible and meaningful tool in adopting a demand driven approach rather than the hitherto followed supply driven approach. The rural water supply & sanitation project implemented by KRWSA is known as JALANIDHI

KRWSA has taken up 3712 water supply schemes in 112 GPs under the first phase of JALANIDHI project, of which 3693 small water supply schemes and 16 large water supply schemes have already been commissioned benefitting 11.28 lakh populations. In addition to water supply schemes other components like ground water recharge activities, latrines, environmental sanitation measures, Rain Water Harvesting etc were also undertaken and successfully completed under the project.

Jalanidhi-II is a World Bank supported Rural water supply and Sanitation Project, based on community ownership and demand driven approaches. This project is a sequel to the Jalanidhi-I implemented during 2000-2008 Negotation for Jalanidhi-II took place between Govt. of India and Govt. of Kerala with World Bank in November 2011. Accordingly the World Bank approved a credit amount of US$155.3 million (credit No.5027-1 N) for implementing the project for total estimate of 1022.30 Cr. Project agreements were signed on 12th February 2012 and it is effective from 17/04/2012.

Project implementation activities were started in 22 Grama Panjayath in 12 districts of Kerala excluding Alappuzha and Eranakulam districts during the year 2012-13. As there were only planning phase activities during the period, no physical infrastructures were completed during the year 2011-12and 2012-13.

10.11 Plan Scheme Allocation and Expenditure 2011-12

Name of the Scheme	Head of Account	Allocation-Rs in Crores	Expenditure-Rs in Crores	Percentage of Expenditure
Add on Project of Jalanidhi-(World Bank Aided Second Kerala Rural Water Supply and Sanitation Project-)	2215-01-800-67	112.50	25.00	22.22
Scaling up of Rain Water Harvesting and G W R Programme throghK R W S A	2215-01-800-64	5.00	0.00	0.00
Installation of Plants for the removel of Iron from Drinking Water	2215-01-800-57	1.00	0.00	0.00
Completion of Rural Water Supply and Sanitation Projects Implemented through KRWSA	2215-01-800-53	5.00	5.00	100.00
Total		**1213.50**	**30.00**	**24.30**

Notable Achievements

World Bank Aided Second Kerala Rural Water Supply and Sanitation Project (Jalanidhi-Phase-II) agreement was signed. Pre-planning activities for Batch-I Grama Panchayath, in which the Project is to be implemented, were started. Selection of 22 Grama Panchayaths and selection NGOs as Support Organisations for each Panchayath was completed. Capacity Building measures have been started.

10.12 Plan Scheme Allocation and Expenditure in Phase-II 2012-2013

Name of the Scheme	Head of Account	Allocation-Rs in Crores	Expenditure-Rs in Crores	Percentage of Expenditure
Add on Project of Jalanidhi-(World Bank Aided Second Kerala Rural Water Supply and Sanitation Project-)	2215-01-800-67	109.82	40.00	36.42
Scaling up of Rain Water Harvesting and G W R Programme throghK R W S A	2215-01-800-64	12.02	8.02	66.72
Installation of Plants for the removel of Iron from Drinking Water	2215-01-800-57	2.50	0.00	0.00
Completion of Rural Water Supply and Sanitation Projects Implemented through KRWSA	2215-01-102-93	2.00	2.00	100.00
Total		**126.34**	**50.02**	**39.60**

Notable Achievements

- Project activities- Jalanidhi - Phase-II, were live in 22 Grama Panchayaths and pre-planning activities were about to complete for Batch-II Grama Panchayaths.
- 1031 nos of Benificiary Groups consisting of 52253 households were registered for implementing Jalanidhi-Phase-II project.
- 27 nos of Single Grama Panchayaths K W A Schems were taken over by the Grama Panchayaths concerned as part of the implementation of Jalanidhi-Phase-II project.
- Water security Plan for 22 Grama Panchayaths and 18 Tribal Grama Panchayaths were prepared in connection with the implementation of Jalanidhi-Phase-II project.
- Arranged the transfer of RS 462.49 lakh as Grama Panchayaths Share and mobilized Rs 672.77 lakh as Beneficiary Contribution in connection with the implementation of Jalanidhi-Phase-II project.

- Source Development Works were started for 141 Nos of Water Supply Schemes as part of Jalanidhi-Phase-II project.
- All Key Staff were positioned with respect to Jalanidhi-II Project and imparted required capacity building measures to all levels of stakeholders as per the scheme cycle.
- Set up 1951 nos of House Hold R W H units under the schemes of scaling up of Rain Water Harvesting and G W R programme through K R W S A.

Sanitation

The concept of sanitation was earlier limited to disposal of human excreta by cess pools, open ditches, pit latrines, bucket system etc. Today it has a comprehensive concept, which includes liquid and solid waste disposal, food hygiene, personal, domestic as well as environmental hygiene. Proper sanitation is important not only from the general health point of view but it has a vital role to play in our individual and social life too. Sanitation is one of the basic determinants of quality of life and human development index. Good sanitary practices prevent contamination of water and soil and thereby prevent diseases. The concept of sanitation was, therefore, expanded to include personal hygiene, home sanitation, safe water, garbage disposal, excreta disposal and waste water disposal. Individual Health and hygiene is largely dependent on adequate availability of drinking water and proper sanitation. There is therefore, a direct relationship between water, sanitation, and health. Consumption of unsafe drinking water, improper disposal of human excreta, improper environmental sanitation and lack of personal hygiene have been major causes of diseases in developing countries. The concept of sanitation includes personal hygiene, garbage, excreta disposal, waste water disposal etc. The Central Rural Sanitation programme(CRSP),a centrally sponsored scheme launched in 1986, was restructured by the Govt. of India in 1999 to introduce the Total Sanitation Campaign. This is one of the data poor sectors.

Total Sanitation Campaign

Total Sanitation Campaign is a comprehensive programme to ensure sanitation facilities in rural areas with broader goal to eradicate the practice of open defecation.TSC envisages synergized interaction between Government, people and active NGOs. It follows a principle of "low to no subsidy" where a nominal subsidy in the form of incentive is given to rural poor households for construction of toilets. TSC had given strong emphasis on Information, Education and Communication (IEC), Capacity Building and Hygiene Education for effective behaviour change with involvement of PRIs, CBOs and NGOs etc. The key intervention areas are Individual household latrines (IHHL), School Sanitation and Hygiene Education (SSHE), Community Sanitary Complex, Anganwadi toilets supported by Rural Sanitary Marts (RSMs) and Production Centers (PCs). The main goal of the GOI is to eradicate the practice of open defecation by 2010. To give fillip to this endeavour, GOI has launched Nirmal Gram Puraskar to recognize the efforts in terms of cash awards for fully covered PRIs and those individuals and institutions who have contributed significantly in ensuring full sanitation coverage in their area of operation.NGP is also a way of awareness as well as a competition between Panchayats for firstly create open defecation free area and seek the Nirmal Gram Puraskar.

Objectives

The main objectives of the TSC are as under.

- Bring about an improvement in the general quality of life in the rural areas
- Accelerate sanitation coverage in rural areas
- Generate felt demand for sanitation facilities through awareness creation and health education
- Cover schools/ Anganwadis in rural areas with sanitation facilities and promote hygiene education and sanitary habits among students
- Encourage cost effective and appropriate technologies in sanitation
- Eliminate open defecation to minimize risk of contamination of drinking water sources and food
- Convert dry latrines to pour flush latrine, and eliminate manual scavenging practice, wherever in existence in rural areas

Waste Management in Kerala

Keralites are traditionally well known for maintaining personal hygiene by almost all sections of people. Environmental awareness is very high in the state due to high literacy. They are therefore demanding better environmental quality. Solid and liquid waste management are the essential components of societal hygiene. But the peculiar characteristics of the state such as high water table in coastal areas, where most of the urban local bodies are situated and long period of monsoon season spread over six months in an year, makes the solid and liquid waste management a challenging job. Another peculiarity of the state is its very high density of dug wells, it comes about 400 dug wells per square Kilometer, makes the job of waste management at household level a difficult task. Small land holdings having well for drawing drinking water and household latrines with on-site excreta disposal system is a common scene in rural settings. In these circumstances finding a suitable site for household processing of solid waste using popular technologies like pit composting, ring composting, or biogas plant is very difficult.

Segregation of wastes at source of generation itself is the key element promoted for managing wastes at household level, institutions and other major waste generators. Encouragement has been given to segregate solid waste to at least two fractions namely, biodegradable and non degradable. Biodegradable wastes include all organic fraction of solid waste, which is intended to be processed at source. If biodegradable, especially the easily biodegradable waste is separated, and then the non-degradable and hazardous waste could be handling safely. Non-degradable wastes include plastics, metal, glass etc. Homely hazardous wastes consist of CFL lamps, tube lights, discarded battery, discarded medicines, mosquito coils, remnant of pesticides, etc. The main advantage noticed from cultivating the habit of segregation and storage of waste at source is that the problematic easily degradable waste can be removed daily for processing at household level or at community level, and the non-degradable and hazardous wastes can be stored for comparatively a longer period, without mixing with biodegradable wastes. The first experiment in this regard in Kerala state was tried during 2003 at Kozhikode Municipal Corporation with the financial assistance of the Ministry of Environment and Forests, Government of India. Two bin systems, green bin for biodegradable and white bin for non-

degradable were issued to the residents. House to house collection was introduced by involving Kudumbasree (Women Self Help Groups) volunteers, which showed encouraging results.

Technologies such as pit composting, ring composting, vermin composting and biogas plants are being promoted for processing of biodegradable wastes at household level and institutional level. Aerobic windrow composting, vermin composting and biogas plants are being promoted for processing of biodegradable waste at community level. In order to help the local bodies, the State Government in the Local Self Government Department has issued a comprehensive guideline on standards, specifications, operation and maintenance of protocol for the above mentioned processing technologies.

In the state, 27 Municipalities and all the five Municipal orporations have already completed the construction of Solid Waste Processing Plants and made the plant operational. They have been following the treatment technology based on biological processing of Municipal Solid waste, using mainly the Windrow Composting and biogas plants, as specified in the MSW Rules. The Suchitwa Mission has been focusing and filling the gap in the field of Solid Waste Management in urban areas and focusing in activities mainly at Grama Panchayats and small Municipality level. The Kerala sustainable Urban Development Project (KSUDP) has been involved in providing technical and financial support to Municipal Corporations, and some of the major Municipalities under the

JNNURM/UIDSSMT schemes. Even though, the technical and financial support have been extended to Municipal Corporations and major Municipalities, through the KSUDP project, there are gaps and issues in those LSGIs in the field of solid waste management. Present status of implementation of Solid Waste Management System in ULbs has been assessed.

The five City Corporations and 53 Municipalities were supported with partial financial assistance from the Suchitwa Mission for establishing full-fledged integrated Municipal Solid Waste Management Facility, with financial support from the state Plan. Funds have also been made available for solid waste management from LSG fund, and financial resource of Jawaharlal Nehru National Urban Renewal Mission Urban Renewal Mission, Urban Infrastructure Development scheme for small and

medium Towns and Kerala Sustainable Urban Development Project. However, there are certain technical issues like odour nuisance, open dumps, menace from flies, birds and dog, need to collect and treat leach ate, need for proper mechanization of processing plants, need to protect the site with boundary wall and barbed fencing, need to have a proper sanitary landfill system, need to have a resource recovery centre, need to have a proper waste management system for slaughterhouses, etc, that required to be addressed for mitigating the environmental impacts linked to ISWM facilities, in general, and waste processing plants, in particular.

The suchitwa Mission has also been providing technical support and part financial assistants to the Grama Panchayats for establishing solid waste management activities. A three level approach is being taken in this regard. At household level, Institution level and community level, biological treatment technologies are being followed for the purpose of source treatment of bio degradable waste. The suchitwa Mission has been giving technical approval and part financial support to Rural LSGIs for establishing solid waste management facilities under the centrally sponsored programme of Total Sanitation Campaign (TSC) and from Plan Schemes of the suchitwa Mission.

At present, the Municipal Corporations and Major Municipalities have been following the treatment technology based on biological processing of Municipal Solid Waste, using mainly the Windrow Composting and biogas plants, as specified in the MSW Rules. Those LSGIs have been facing the difficulties such as lack of adequate land for disposal of rejects from the compost plants, inadequacies of processing facilities and odour nuisance, excessive leach ate generation, water pollution and other environmental issues from operation of the compost plants. The major issues faced by these plants are being highlighted by media and there are public protests in some urban local bodies. There is a wide spread public concern over the management of Municipal Solid Waste especially in Corporation and major Municipalities. Hence, the Government is in the process of searching for alternate or better technologies for solving the above mentioned issues in those urban LSGIs. The selected technological options are too tried under the Kerala condition, in consideration of its special waste characteristics, climatic conditions, land constraints, environmental sensitiveness, etc.

There are a lot of environmental and operational issues due to mixing of waste plastic carry bags with municipal solid wastes. Therefore, the LSGIs are facing lot of problems in their waste treatment activities due to higher percentage of plastic waste. More over unscientific disposal of waste plastic carry bags led to various environmental issues in the State. The Plastic Waste (Management and handling) Rules, 2011 notified under Environment (Protection) Act, 1986 insist that the local bodies have to take action for collection of waste plastic carry bags and to take action for using the collected carry bags for mixing it with bitumen for road tarring and or co-incineration in the kilns of cement plants. The LSGIs are as part of their waste management projects, are planning to establish Plastic shredding Units at Grama Panchayat and Municipality level, for shredding the collected waste plastic carry bags. There is therefore an urgent need for utilization of these shredded plastic carry bags for road tarring or co- incineration in the Cement Kilns, as stipulated in the said Rules. In the case of sanitary latrines, Kerala has a good record. We have extensive coverage of sanitary latrines in the state. The coverage increased exponentially in the 90's backed up by a well organized programme and commitment of funds.

Emerging challenges of waste management in Kerala are many. Following are a few important challenges:

- Per capita generation of wastes in Local Self Governments in Kerala is higher than those in other states due to the peculiar consumption pattern in the State.
- Primary collection is limited to urban local self Governments. Storage of waste at source is limited to a few cities and towns.
- Plastic wastes and e-wastes are on the increase.
- After attaining high coverage of sanitary latrines, the remaining target mostly consists of landless people or those having very low extent of land, where construction of toilets poses a major challenge.
- High water table areas particularly in the coastal and in low lying areas like Kuttanad pose a technological challenge.
- Septage treatment has not been addressed so for.

10.13 District- Wise Financial Progress 2012-13 (release VS Expenditure)

Sl. No.	State/District	Release Amount (in Lakhs)				Expenditure Amount (in Lakhs)			
		Central	State	Bene-ficiary	Total	Central	State	Bene-ficiary	Total
1	Alappuzha	0.00	0.00	0.10	0.10	27.19	0.01	2.00	29.20
2	Eranakulam	0.00	0.00	0.00	0.00	72.13	22.71	0.00	94.84
3	Idukki	0.00	0.00	0.00	0.00	170.34	85.25	3.55	259.14
4	Kannur	0.00	0.00	0.00	0.00	23.16	14.29	0.00	37.45
5	Kasaragod	0.00	0.00	0.00	0.00	45.18	17.67	0.00	62.85
6	Kollam	0.00	0.00	0.00	0.00	19.78	6.62	0.00	26.40
7	Kottayam	0.00	0.00	3.15	3.15	32.41	10.75	12.21	55.37
8	Kozhikode	0.00	0.00	0.00	0.00	20.94	5.82	0.00	26.76
9	Malappuram	0.00	0.00	0.40	0.40	22.64	5.74	0.40	28.78
10	Palakkad	0.00	0.00	12.71	12.71	234.44	152.90	12.71	400.05
11	Pathanam Thitta	0.00	0.00	0.00	0.00	19.27	3.34	174.34	196.95
12	Thiruvanantha puram	0.00	0.00	0.00	0.00	99.05	10.07	5.29	114.41
13	Thrissur	0.00	0.00	0.00	0.00	110.96	34.75	0.00	145.71
14	Wayanad	0.00	0.00	0.00	0.00	54.02	1.84	0.00	55.86
	TOTAL	**0.00**	**0.00**	**16.36**	**16.36**	**951.51**	**371.76**	**210.5**	**1533.77**

Source: suchitwa Mission

10.14 District- Wise Physical Progress 2012-13

Sl. No.	District Name	IHHL (BPL)	IHHL (APL)	IHHL (Total)	Sanitary Complex	School Toilets	Anganwadi Toilets	RSM	PC	SLWM	Total School covered
1	Alappuzha	0	0	0	0	0	0	0	0	0	0
2	Eranakulam	0	0	0	0	0	0	0	0	11	0
3	Idukki	3018	0	3018	15	17	0	0	0	0	0
4	Kannur	0	0	0	0	0	0	0	0	0	0
5	Kasaragod	0	0	0	4	0	0	0	0	0	0
6	Kollam	0	0	0	0	0	0	0	0	7	0
7	Kottayam	0	0	0	10	17	0	0	0	0	9
8	Kozhikode	0	0	0	1	0	0	0	0	0	0
9	Malappuram	0	0	0	4	0	92	0	0	0	0
10	Palakkad	0	0	0	0	0	0	0	0	3	0
11	Pathanamthitta	0	0	0	0	0	0	0	0	0	0
12	Thiruvananthapuram	2656	0	2656	13	0	230	0	0	0	5
13	Thrissur	0	0	0	2	0	0	0	0	20	0
14	Wayanad	0	0	0	0	0	0	0	0	0	0
	Total	**5674**	**0**	**5674**	**49**	**34**	**322**	**0**	**0**	**41**	**14**

Source: suchitwa mission

10.15 Year wise achievements of Physical Components

2002-03 to 2012-13

Sl. No.	Component	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
1	IHHL BPL	100867	108225	138982	130298	100087	246152	74297	56723	20047	2188	5674
2	IHHL APL	0	6800	27450	23688	21571	44033	7568	11579	194	0	0
3	TOTAL IHHL(BPL+ APL)	100867	115025	166432	153986	121658	290185	81865	68302	20241	2188	5674
4	Sanitary Complex	71	331	110	31	24	63	89	153	58	68	49
5	school Toilets	112	757	435	320	221	672	605	448	29	76	34
6	Anganwadi Toilets	0	15	476	291	163	1416	713	1390	195	60	322

Source: suchitwa mission

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