

Chapter-6

Research Setting

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In any social science research, it is hardly possible to conceptualize and perceive the data and interpret the data more accurately until and unless a clear understanding of the characteristics in the area and attitude or behavior of people is at command of the interpreter who intends to unveil an understanding of the implications and behavioral complexes of the individuals who live in the area under reference and from a representative part of the larger community. The socio demographic background of the local people in a rural setting has been critically administered in this chapter. A research setting is a surrounding in which inputs and elements of research are contextually imbibed, interactive and mutually contributive to the system performance. Research setting is immensely important in the sense because it is characterizing and influencing the interplays of different factors and components. Thus, a study on Perception of Farmer about the issues of Persuasive certainly demands a local unique with natural set up, demography, crop ecology, institutional set up and other socio cultural

milieus. It comprises of two types of research setting viz. Macro research setting and Micro research setting.

Macro research setting encompasses the state as a whole, whereas micro research setting starts off from the boundaries of the chosen districts to the block or village periphery. The notion behind this form of presentation is to internalize the study environment in terms of broader perspectives with state as reference frame and district, block profile as units for in-depth study.

The present study was taken up at the Maludand Titipa village, of Krushnaprasad Block and Brahmagiri and Alarapur village of Brahmagiri Block, of Puridistrict of Odisha. A brief description of Odisha, Puri district in general and the blocks and villages in particular is given below.

Area of study

The area of investigation of this study is situated in the state of Odisha located in the eastern part of India. The state of Odisha has a unique social, cultural and ecological background, which influences the living standard and behavioral patterns of the people in many ways. The area of investigation belongs to Maludand Titipa village of Krushnaprasad Block and Brahmagiri and Alarapur village of Brahmagiri Block, of Puri district.

Profile of the State Odisha

Introduction

Odisha is situated on the coast along the Bay of Bengal. Different parts of modern orissa was anciently known as Utkal, Kalinga, Udra, Koshala and Kodanga In the history of mankind Odisha always stands for great stand for human value and glory for superb intelligence. Odisha has gifted with

nature's bounty, a 482 km stretch of coastline with golden beaches, serpentine rivers, mighty waterfalls, forest-clad blue hills of Eastern Ghats with rich wild life. Orissa is quite rich in its heritage that houses many remarkable monuments of ancient times. The entire length and breadth of Odisha is marked with remarkable tourist places and each place of India has a tale to tell to its tourist. The patrons of culture and Architecture can perceive the marvelous Architecture of the temples, rock-cut caves and also the forts that once belonged to the Great Oriyan King, radiating the rich heritage of Odisha. The Architecture of edifices, like the Konrak Temple, Jaggrnath Temple, Barbati Palace, Rajrani temple, Khandagiri caves, and the Lalit Giri & Uday Giri are really remarkable. The land, while retaining its pristine glory, also offers the visitors modern amenities. The most important monuments of this period can be seen in and around Bhubaneswar and Puri. The Mukteswar Temple is the finest piece of architecture of Kalinga. The Lingaraj Temple of Bhubaneswar, the Jagannath Temple of Puri above all the world renowned world heritage Sun Temple at Konark is the epitome of temple architecture and sculpture. But the modern Odisha came into existence in April 1, 1936. The Britishers declared it as a separate province. In 1948 and 1949 the area of Odisha was almost doubled and the population was increased by a third with the addition of 24 former princely states. In 1950, Odisha became a constituent state of India. Now, Odisha has become a multi-dimensional, multi-colored, many splendored, vibrant & boisterous modern state all set on its journey in the present millennium to make its presence and voice felt in the nooks & crannies of the world through the Universal Cult of brotherhood, its unique

cultural heritage, luxuriant forests & wild life, sprawling Chilika Lake, bountiful coastline, wide range of tribes & colorful canvass of art & culture. Orissa has been resurgent again rejuvenating and resuscitating its ancient glory, glamour & greatness. Its lush green countryside and fertile plains, tiny hamlets fringed with palm, coconut trees and mango groves offer the charm of rural beauty while the urban pockets, the four cities in particular, with the splendor of modern technology provide the amenities necessary for a comfortable stay. This wonderful land of fascinating beauty boasts of colorful festivals round the year. Odisha is also the land of unique handicrafts and other excellent artefacts.

Odisha located on the eastern seaboard of India between 17° 49' and 22° 36' North latitudes and between 85° 36' and 87° 18' East longitudes. It spreads over an area of 1, 55,707 sq. km. Administratively, the State is divided into 30 districts, 58 sub-divisions, 314 blocks and 103 urban local bodies. With population of 4.19 crore as per the 2011 census (provisional), the average density of population comes to 269 per sq. km. with significantly higher density in the coastal areas compared to the interior parts. It has a 482 km coastline. Major river systems are the Mahanadi, the Brahmani, the Baitarani, the Subarnarekha, the Budhabalanga, the Vansadhara, the Rushikulya, the Nagabali, the Indravati, Kolab and the Bahuda. The geo-climatic conditions of the State make it vulnerable to multiple disasters such as flood, cyclone, drought, heat wave, hailstorm, lightning, fire, earthquake and tsunami.

Coastal Resources/ Marine areas of the Odisha

The state of Orissa has an extensive coastline measuring 480 Kms, bestowed with rich diversity. Orissa coast accounts for 8% of the total coastline of India. Mangroves, Sea grasses provide vital breeding, nursery and feeding areas for a number of marine species and contribute significantly towards the commercial fishery of the State. The bountiful coastal area encompasses the unique Chilika lagoon, Bhitarkanika one of the richest and diverse mangrove ecosystem endowed with, largest rookery of Olive Ridley and largest repository of estuarine crocodile. Out of the thirty districts of the state nine namely Ganjam, Khurda, Puri, Jagatsinghpur, Kendrapara, Bhadrak, Balasore, Jajpur and Cuttack are considered as coastal districts. These districts are with highest density of population i.e. from 300-500 per square kilometres. The state capital and the major cities of the state are also located in these districts. The major rivers, which flow to Bay of Bengal, through the State are Mahanadi, Brahmani and Baitarani river systems that have formed extensive delta. The Rushikulya system lying in the south in the district of Ganjam and Budhabalanga and Subarnarekha lying in the north in the district of a Balasore has very little or no deltaic formation. The Eastern ghat range of hills runs parallel to the coast within 25 to 35 km. of sea. Several wetlands are observed within the State in different geo-environmental conditions.

Ecology of Odisha

Botanical Garden	State Botanical Garden
Zoological Parks	Nadanakanan
Biogeographical Zone	Semi-arid
Ecosystem	Forest ecosystem

Physiological Features	Mountains Plateau Delta Estuary	
Soil Types	Laterite Red Alluvial Mixed	
Forest Types	Tropical	
National Parks	<ul style="list-style-type: none"> • Nandanakanan • Bhitarkanika • Similpal 	
Wildlife sanctuaries	<ul style="list-style-type: none"> • Bhitarkanika • Chilika Lake • Similpal National Park • Nandankanan • Raigarh, Dhenkanal • Deogarh Sanctuary • Balukhand Sanctuary, Puri • Ushakothi Sanctuary, Sambalpur • Avayaranya Sanctuary • Wild life Sanctuary, Sambalpur 	
Bird Sanctuaries	Chilika Lake	
Tiger reserves	Similipal	
Biosphere reserves	Similipal	
Rivers	Mahanadi Banshadhara Rusikulya Subarnarekha Tel Koili	Brahmani Anga Suna Kharasrota Daya Mahendratanya Kathajodi
Dams	<ul style="list-style-type: none"> • Rengali Dam • Indravati Dam • Hirakud Dam 	

Sl. No.	Indicators	1950-51	1960-61	1970-71	1980-81	1990-91
1	Share of Agriculture in NSDP (%)	66.8*		54.6		30.0**

2	Percentage of Total Population Living in Rural Area	95.9	93.7	91.6	88.2	87.0
3	Percentage of Total Workforce Engaged in Agriculture		73.8	77.4	74.7	73.0
a	Percentage of Cultivators to Main Workers		56.8	49.2	46.9	44.3
b	Percentage of Agricultural Labourers to Main Workers		17.0	28.3	27.8	28.7
4	Per Capita Availability Of Cultivated Land (Ha)	0.39	0.38	0.31		0.18**

Note : * Figures for 1951-52

**Figures for 1998-99

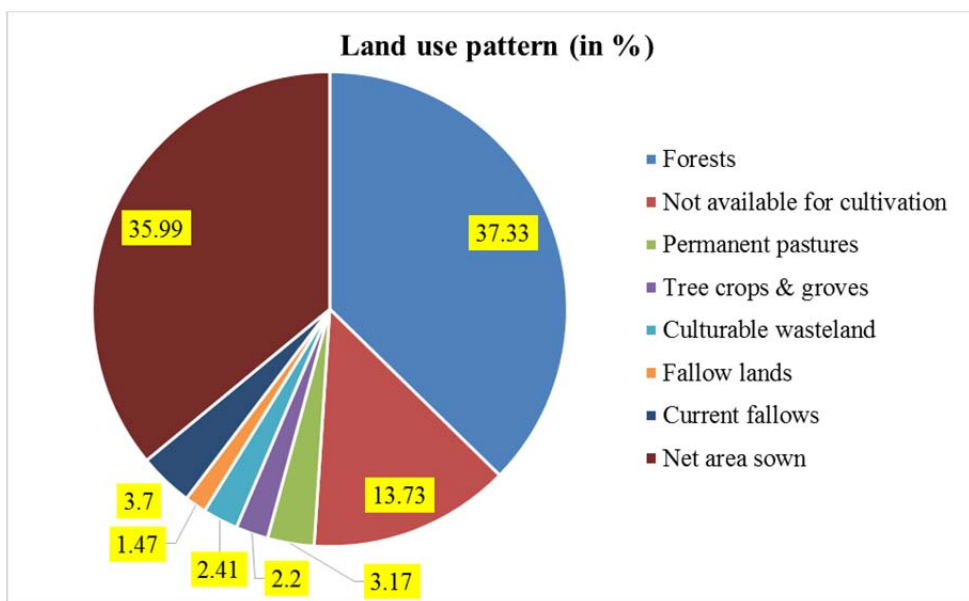
Source Government of Orissa, *Economic Survey* (Various Issues), and *Statistical Abstracts of Orissa*, (Various Issues)
 Directorate of Economics and Statistics, Orissa, Bhubaneswar.

Land use pattern of Odisha

Land Use	Area in '000 ha	Percentage
Total geographical area	15571	100
Forests	5813	37.33

Not available for cultivation	2138	13.73
Permanent pastures	494	3.17
Tree crops & groves	342	2.2
Cultivable wasteland	375	2.41
Fallow lands	229	1.47
Current fallows	773	3.7
Net area sown	5407	35.99

DoA, Odisha, 2011



PURI

Puri District is a coastal District on the eastern part of Odisha, India. This District needs no introduction, being the abode of Lord Vishnu, most popularly known as Lord Jagannath. This District derives its name from the heritage city of Puri, one of the four pilgrimage centers of India. Covering an area of 3051 sq. kms, the District may be divided into two dissimilar natural divisions-the Littoral tract and the Level alluvial tract. It is also located at 19° 28 N Latitude 26° 35 N, 84° 29 E. Longitude 86° 25 E. Its

altitude is at sea level. Paddy, wheat, mung, biri, kulthi and groundnut are some of the major crops grown in the District.

The number of rivers flowing through the District helps in sustaining the agriculture. Being in close proximity to the Bay of Bengal, this District has tropical climate. The summers are from March to June, monsoons from June to September and winters are from October to February. The minimum temperature of the District is approximately 16.45 degrees Celsius and the maximum 33.9 degrees Celsius.

Handicraft and cottage industries of this District is famous the world over, its original source being the temple craft of Lord Jagannath and the Sun Temple at Konark. The rich traditional culture and heritage of the District gives a boost to this industry. The important products of this industry are in applique, stone carving, pattachitra, wood carving, modern patch work, terracotta, bell metal, and sea shell items etc. The District Industries Centre, on its part has imparted training and upgraded the skill of the traditional artisan families and other economically weaker sections of the people, thus improving their per capita income. It has introduced many promotional schemes and also promotes handicraft training schools and coir training centers etc. There are also a number of small scale industries running in this District.

Puri District has given birth to a number of eminent personalities-both past and present. The past personalities included Jayadeva, Gobardhan Acharya, SridharaSwamy, Jagannath Das, Raya RamanandaPattanayak, KanhaiKhuntia, Jayadeva-II, KaviChintamani Mishra, Balaram Das, Jagannath Das, Bhakta KaviSalbeg, Dinakrushna Das and

UtkalmaniPanditGopabandhu Das. Noted present personality who has brought laurels for the District both in India and abroad is Padma Bhusan Guru KelucharanMohapatra. His contribution towards Odissi dance is remarkable.

Administrative Setup

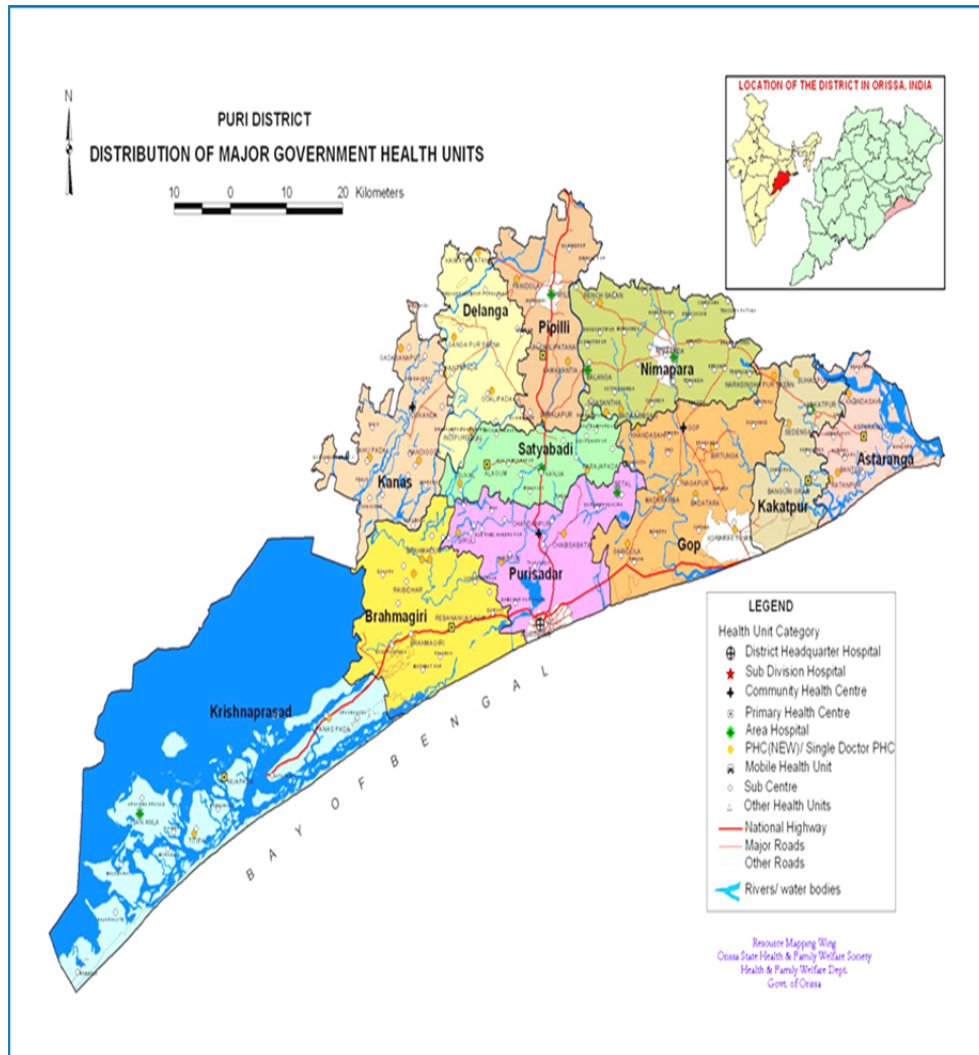
No. of Sub-Divisions :	1	No. of Tehsils :	11
No. of Municipalities/Corporation :	1	No. of N.A.Cs :	3
No. of Blocks :	11	No. of Police Stations :	23
No. of Gram Panchayats :	230	No. of Inhabited Villages :	1591
No. of Uninhabited Villages :	124	No. of villages :	1715
No of D.A.O circles	3	No of A.A.O Circles	22
Nos. of VAW Circle	128	Nos. of VAW in Position	115

Blocks	Tahasils	Sub-divisions
1. Purisadar 2. Pipili 3. Delanga 4. Kanas 5. Nimapada 6. Kakatpur 7. Astaranga 8. Brahmagiri 9. Krushnaprasad 10. Satyabadi 11. Gop	1. Krushnaprasad 2. Nimapada 3. Pipili 4. Puri 5. Kakatpur	1. Puri

Geographical and Population details of the District

Geographical Area :	3,479.00 sq.km	Area under Forest :	137.00 sq.km	3.94 %
Population (2011 Total :			1,697,983	in %

Census)	Male :	865,209	50.96
	Female :	832,774	49.04
	Rural :	1,432,537	84.37
	Urban :	265,446	15.63
	Scheduled Caste :	273,917	16.13
	Scheduled Caste Male :	138,550	50.58
	Scheduled Caste Female :	135,367	49.42
	Scheduled Tribe :	4,482	0.26
	Scheduled Tribe Male :	2,355	52.54
	Scheduled Tribe Female :	2,127	47.46
Population Density :	488 (Per sq.km)		
Female per 1000 male :	963		
Literacy	Total Literate :	1,309,170	85.37
	Literate Male :	716,143	91.84
	Literate Female :	593,027	78.67
	Total Illiterate :	224,425	13.22
	Illiterate Male :	63,622	28.35
	Illiterate Female :	160,803	71.65
Households	Total Households :	287,463	
	Rural Households :	247,682	86.16
	Urban Households :	39,781	13.84
	BPL Households (1997 Census) :	163,639	--
	SC/ST Households (1997 Census) :	45,690	--
Farm Families	Total	1,73,739	
	Small farmers	38,506	22.16
	Marginal farmers	1,20,624	69.43
	Medium & Big farmers	14,609	8.41
Agricultural laborer(2001)	1,28,887		



Agro-climatic Zones in Orissa

Agriculture of Puri District

Agro climatic Zone-East and South Eastern Coastal Plain.

Land Utilisation Pattern (in hector):

(1) Geographical area-3,48,102 Ha.

(2) Cultivable area-1,88,745 Ha.

- (3) Paddy area-1,42,000 Ha.
 (4) High land-Nil.
 (5) Medium land-57,419 Ha.
 (6) Low land-84,581 Ha.

Block wise cultivable area

Sl.	Name of the Block	Kharif Paddy area				Non-paddy area	Saline Area	Water logged Area	Grand Total
		Hig h	Medium	Low	Total				
1	Puri	0	4058	8442	12500	595	1700	1713	16508
2	Brahmagiri	0	5190	4210	9400	490	3000	4560	17450
3	Krushna Prasad	0	6739	4361	11100	895	1500	1286	14781
4	Satyabadi	0	5705	4395	10100	1793	0	1519	13412
5	Pipili	0	6724	9076	15800	3358	0	221	19379
6	Delang	0	5803	10897	16700	1263	0	102	18065
7	Kanas	0	3795	7505	11300	685	1700	3392	17077
8	Nimapara	0	8395	11105	19500	5050	700	983	26233
9	Gop	0	5643	14057	19700	2959	600	2117	25376
10	Kakatpur	0	3163	4637	7800	1323	220	126	9469
11	Astarang	0	2204	5896	8100	1099	1480	316	10995
	Total	0	57419	84581	142000	19510	10900	16335	188745

Irrigation Potential:

Kharif- 2011-1, 06,100 ha.
 Rabi -2011-12-69,395 ha.

Cropped area:

- (a) Single cropped area-71,364 ha.
 (b) Double cropped area-1, 17,381 ha.
 (c) Triple cropped area-Nil

No. of fertilizer sale point:

- (a) Whole sellers-37 nos.
 (b) Retailers-218 nos.

(1) Nos. of Pesticide dealer-107 nos.				
(2) Nos. of S.C.S.-214 nos.				
(3) Nos. of Block sale Canters-11				
(4) Nos. of Addl. Sale Canters-12				
Productivity of Kharif paddy in kg/hect.:				
Sl.	Year	Local	High Yielding	Total
1	2008-09	1224	1980	1833
2	2009-10	1273	2024	1878
3	2010-11	1545	2664	2444
4	2011-12	1683	2891	2661
Fertiliser consumption (in kg./Hect.):				
Year	Kharif	Rabi		
2009-10	45.02	26.02		
2010 -11	68.22	58.82		
2011-12	55.88	60.43		
Rainfall:				
The average annual rainfall of the district is 1408.8 mm normally received in 62 rainy days.				
Kharif-2011-Achievement :				
The coverage of different crops during Kharif-11 in the district against the target is as follows-(Fig. in hect.)				
Sl.	Name of the Crop	Programme	Achievement	
1	Paddy	142000	1,42,003	
2	Other Cereals	300	300	
3	Pulses	50	0	
4	Oilseeds	120	32	
5	Fibres	80	62	
6	Vegetable	16,970	17,107	
7	Spices	1580	1596	
Total		1,61,100	1,61,100	
Rabi-2011-12 Achievement :				

The coverage of different crops during Rabi 2011-12 in the district against the target is as follows-(**Fig. in hect.**)

Sl.	Name of the Crop	Programme	Achievement
1	Paddy	44,700	38,680
2	Other Cereals	210	210
3	Pulses	70,640	70,807
4	Oilseeds	21,670	21,670
5	Vegetable	10,700	10,718
6	Spices	2010	2015
7	Sugar Cane	450	410
Total		1,50380	1,44,510

N.B – Paddy Coverage during Rabi 2011-12 reduced due to less supply of Irrigation Water under Major commands.

Irrigation:

During last Kharif 2011 season, water from different sources of irrigation was available to crops for an area of 1,06,100hect. & During Rabi 2011-12 it was for 69,395 Ha. The details are as follows-(Fig. in hect.)

Sl.	Name of the Sources	Kharif 2011	Rabi 2011-12
1	Major	75,339	37,104
2	Minor	166	0
3	L.I.P.	18,265	17,215
4	Others	12,330	15,076
Total		1,06,100	69,395

Seeds:

Programme and Achievement on utilization of different seeds during Rabi 2009-10 is as follows-(**Fig. in Qtls.**)

Sl.	Name of the Seeds	Qty. supplied	Qty. sold
1	Paddy	1225.8	1225.8
2	Wheat	82.8	82.8
3	Maize	-	-
4	Mung	111	111
5	Biri	198.35	198.35
6	Gram	-	-
7	Fieldpea	4.40	4.40
8	Mustard	49.74	49.74

9	G.nut	13949.7	13949.7
10	Sun flower	11.70	11.70

Seed Minikits:

During last Rabi 2011-12 season, 750 nos. of Ground nut, 1000 nos. of mustard and 75 nos. of Sunflower minikits were distributed to the cultivators in the district.

Seed Village Programme:

For production of certified seeds 340 hec. of paddy , 520 hec. of groundnut ,40 hect of Mung& 80 hec. ofBiri have been taken under seed village scheme during Rabi 2010-11 season.

Consumption of Chemical Fertiliser:

Nutrientwise Fertilizer Consumption During Rabi -2010-11 (Fig. in M.T)

Sl.	Nutrient	Target	Consumption during Rabi, 2010-11
1	N(Nitogen)	6707	4079
2	P (Phosphates)	3467	1814
3	K (Potash)	4120	1468
	Total	14293	7361
	Kg/Hect. Consumption	86.0	58.82

Industries and Handicrafts of Puri District

District Industries Centre (DIC), Puri is the pivotal agency in the district for promotion of Micro, Small & Medium enterprises; Promotion of handicrafts & cottage Industries, Promotion of Village industries under the administrative control of Govt of Odisha in Industries Department . The role & activities of DIC is mentioned as below.

Strength of Micro Small Medium Enterprise (MSME) in Puri District:

Description	Puri District
No of Units in Nos.	3131
Investment (Rs. In Lakhs)	9797.49
Employment in Nos.	16525

Industrial Scenario of the District:

Since inception of DIC till the end of the year 2000–09, 2329 Nos. of SSI units have been promoted under DIC, Puri with investment of Rs.7465.10 Lakhs generating employment opportunity for 12,654 persons. The broad category of industries promoted along with their numbers is as follows

Sl.	Category of Industries Promoted	Nos. Promoted
01	Agro Based	1323
02	Forest Based	162
03	Animal/Husbandry Based	21
04	Textile Based	324
05	Chemical Based	90
06	Engineering/ Allied Based	385
07	Building/Ceramic Based	301
08	Plastic/Rubber Based	51
09	Miscellaneous/Service Based	1285
TOTAL		3942

Topography of Puri

The whole of the district may be divided into two dissimilar natural divisions.

- 1) The littoral tract
- 2) The level alluvial tract

1) **The littoral Tract:-**The strip of the country lies between the alluvial and the Bay of Bengal. It assumes the form of a broad sandy ridge which stretches along the sea- shore for the full length of the District, Varying from 6.5 Km. to a few hundred metres in width. Accumulations of wind-

blown sand give rise to ridges parallel to the coast. It forms the dividing line between the Chilikalake and the ocean

2) The Level Alluvial tract:-This level of alluvial region is full of villages and rice fields, watered by a network of channels, through which the water of distributaries of the most southerly branch of Mahanadi, find their way to the sea. There is no hill in Puri District except a small cultivate land are under plough. Generally biali or autumn rice, sarada or winter rice and dalua or spring rice these three types of rice are cultivated.

Sea-coast Bays

The length of the sea-coast of the district of Puri is nearly 150.4 km. Sandy ridges are found along the sea-coast which stretch into the district Jagatsingpur and Ganjam. One such sandy spit divides the lake Chilika from Bay of Bengal. These sandy ridges and dunes are formed by the strong monsoon currents which blow over the country for nearly 8 months of the year. The ridges vary from about 7 km to a few metres in width and have prevented most of the rivers of the district from finding their way into the ocean.

Island

No Island is found in the coastal waters of Puri, but the Chilikalake is separated from the Bay of Bengal by a group of Islands.

Port

Puri is endowed with no natural harbour nor its coast is suitable for any artificial one.

River system

All the rivers of Puridistrict have a common characteristics. In the hot weather they are beds of sand with tiny streams or none at all, while in the rains they receive more water than they can carry. Generally all rivers are distributaries of Mahanadi River.

1) Kushabhadra 2) Daya 3) Bhargabi 4) Kadua 5) Prachi

1) Kushabhadra- A branch of Kuakhai river starts from Baliana meets Bay of Bengal at the shrine Ramachandi, 15 miles east of Puridhanuaande, its tributary mugei joins with Kushabhadra.

2) Daya-A branch of Kuakhairiver falls in Chilika lake. Two small rivers enter the Daya, the Gangua and the Managuni below Kanas. An important problem in connection with dayais that theChilikalake at its outfall is silting up.

3) Bhargabi-A branch of Kuakhai meets the Bay of Bengal after breaking up into numerous branches in the last two and half miles of its course. There are four main branches all taking off from the left bank.viz. Kanchi , the east Kania , the Nayanadi and the South kanchi falls in Sarlake; and by various channel the first three are interconnected and finally join the Sunamunhi river which falls into Bali Harchandi and ultimately to the Bay of Bengal via the mouth of Chilika. The South kania gets lost in the marshes on the western shore of Chilika.

There are two small rivers Ratnachira and Nuna falls in Bhargabi and Daya respectively.

Kadua -It is a Monsoon stream which falls into Prachi.

Prachi- It is the branch commencing from Puri and Jagatsinghpur district. It has the origin near Kantapara on Cuttack-Gop road and passing through the village of Kakatpur fall in Bay of Bengal.

Devi- It is branch of Kathajori. It runs into Puri district near the extreme east forming numerous branches.

Lakes and Tanks

- The Chilika lake
- The Sar Lake

Chilika Lake

Location & Situation Chilika Lake (19°28'N-19°54'N and 85°6'E-85°35'E) lies in the districts of Puri, Khurda and Ganjam in the state of Orissa, on the eastern coast of India. Chilika lies on the main Madras-Calcutta highway (National Highway 5) and Madras-Howrah rail line passes the western bank, near Balugaon, Chilika and Rambha being the main stations along the Lake. Chilika lies about 50 km southwest of the city of Puri from where one can approach Satapara by road on the eastern bank of Chilika. It is 100 km away from BijuPattnaik Airport, Bhubaneswar and 1 km from Balugaon railway station.

The Lake is surrounded by a strip of silted and reclaimed land. On the northeast margin lies an extensive area of marshy land, some of which has been reclaimed for agriculture. Other silted up land around the northern and central margins has been reclaimed for agriculture and is separated from the Lake by bunds (dykes). The Lake margins are steeper in the central and southern sectors, and rocky promontories jut-out into the Lake at several

places. The land is less flat and somewhat rocky, being part of the Eastern Ghats. The estuary of the Rushikulya River lies about 18 km down the coast, and is separated from Chilika by lowlands, some of which are used as salt pans (Rao et al. 1986). The 21 km long Palur canal connects the Rushikulya estuary to the Lake.

Chilika Lake is situated on the east coast of India. It is one of the largest brackish water wetland of Asia with estuarine character. It is the largest wintering ground for migratory water-fowl found anywhere on the Indian sub-continent. It is one of the hot spot of biodiversity, and some rare, vulnerable and endangered species listed in the IUCN Red List of threatened Animals inhabit the Lake area for at least part of their life cycle. This list includes a number of rare, threatened and endangered species such as Irrawady dolphins and the Barakudia limbless skink. The Nalabana wildlife Sanctuary is located within the Lake. The Lake is a highly productive ecosystem, the rich fishery resources sustains the livelihood of more than 2, 00,000 fisher folk who live in and around the Lake. But the traditional techniques of fishing in Chilika like Janao, Bahano, Dian, Uthapani and Dhaudi are gradually being phased out. Based on its rich biodiversity and socio-economic importance, Chilika Lake was designated by the Government of India as a Ramsar Site in 1981, especially as an important Water-fowl habitat. The water spread area of the Lake varies between 1165 and 906 sq.km during the monsoon and summer respectively. The Lake itself can be broadly divided into four ecological sectors based on salinity and depth, the southern sector, central sector, northern sector and the outer channel. Numerous islands are present in the Lake, prominent

among which are Mahisa, Berhampura, Nalabana, Kalijai, Somolo, Honeymoon, Breakfast and Birds islands, etc.

Hydrologically, Chilika is influenced by three subsystems; the Mahanadi distributaries, the rivers/ streams draining in to the Lake from the western catchment and the Bay of Bengal. Ecologically, Chilika is an assemblage of marine, brackish and freshwater eco-systems which supports a diverse and dynamic assemblage of plants and animal. Salinity is the most dominant factor determining the Lake's ecology and the salinity dynamics are controlled jointly by the nature of the connection to the sea, associated tidal fluctuations, and the volume and timing of freshwater inflows to the Lake from the delta distributaries and western catchments. Numerous islands are present in the Lake, especially near the channel. Best known among them is Nalabana, a low flat marshy island of 15.53 sq. km, covered with low vegetation. The NalabanIsland was notified as a wildlife Sanctuary in 1987 considering its unique features as a habitat for the avifauna.

Few Facts about Chilika Lake

Location	Lat 19°28'-19°54'North dcLon 85°05'-85°38'East
Boundaries	East:- Bay of Bengal West:- Rocky hills of Eastern Ghats North:- Alluvial plain of Mahanadi Delta South:- Rocky hills of Eastern Ghats
State	Odisha
District	Puri, Khurda&Ganjam
Shape	Pear shaped
Length and Breadth	Max length – 64.30 kms Max breadth – 18.00kms Min breadth – 5.00kms

Research Setting

Water spread area	Maximum – 1165km ² 906km ²	Minimum –
Spit (Sand bar)	Length – 60kms 0.6kms to 2.0kms	Width –
No. of rivers and rivulets draining Into the lake	52 Nos	
Total area of islands	223 km ²	
Lake mouth	2	
Major Ecological Division	i. Northern Sector ii. Central Sector iii. Southern Sector iv. Outer Channel	
Depth	0.38 – 6.2 m	
Catchment area	3560km ²	
Fishermen villages	132	
Fishermen families	12,363	
Total No. of Primary Cooperative Societies (Fish)	66	
No. of Jetty	19	
Bird population in winter	7,19,262	
Birds species	224	
Fish species	314	
Prawn species	29	
Crab species	35	
Dolphin no.	152	
Tourist boats	600	
Fishing boats	5300	

- Generate from fisheries resources more than 71% of total economic value of the ecosystem, which establishes that the Chilika fishery is the most important renewable living aquatic resources; but not infinite.
- Yields more than 10,000 MT (Avg.) fish, prawn and mud crabs valued at Rs. 587 million (Avg.) per annum.
- Exhibits high species diversity of fishes (267 species), shrimps & prawns (29), Lobster (2) and crabs (35).
- Provides an ideal habitat for the rare species of limbless lizard i.e. *Barkudiansularsis*.
- The largest wintering ground of Asian subcontinent.
- Harbors largest Lake Population of Irrawaddy dolphins of the region.
- Contributes substantially to Odisha's sea food exports (7.56% by volume and 6.72% by value).
- is an abode of major tourism destination in the state of Orissa

Landuse/ Landcover:

The landcover/ landuse map derived from satellite imagery indicates that the predominant landuse class in the catchment area is agriculture characterized by 61.55% of the total catchment area. However, the western catchment under the Eastern Ghat domain is represented by a major patch of forest area characterized by mixed deciduous forest.

Table showing the Landuse/ Land cover area of Chilika

Landcover/ Landuse Class	Area in Sq. Km.	Percentage of Total Area
Town/cities	83.80	2.10
Village	126.29	3.17

Dense forest	229.05	5.74
Open forest	257.64	6.46
Scrub Forest	176.91	4.44
Forest/coastal plantation	74.35	1.86
Land with scrub	141.43	3.55
Land without scrub	18.87	0.47
crop land (fallow)	0.31	0.01
crop land (kharif)	2454.40	61.55
Agricultural plantation/Orchard	176.13	4.42
Sandy area (river/coastal)	0.01	0.00
Wasteland (Marshy/Swampy/Waterlogged)	108.14	2.71
Water body	136.90	3.43
Other	3.17	0.08
Total Catchment	3987.40	100.00

Avi fauna

Chilika Lake is the largest wintering ground for migratory birds, on the Indian sub-continent. It is one of the hotspots of biodiversity in the country. Some species listed in the IUCN Red List of threatened animals inhabit the lake for at least part of their life cycle.

Migratory water fowl arrive here from as far as the Caspian Sea, Baikal Lake and remote parts of Russia, Mongolia, Lakah, Siberia, Iran, Iraq, Afghanistan and from the Himalayas. A census conducted in the winter of 1997-98 recorded about 2 million birds in the lake.

In 2007, nearly 840,000 birds visited the lake, out of which 198,000 were spotted in Nalbana Island. On Jan 5, 2008, a bird census involving 85 wildlife officials counted 900,000 birds of which 450,000 were sighted in Nalabana. Removal of invasive species of freshwater aquatic plants, especially water hyacinth, due to restoration of salinity, is a contributing factor for the recent increasing attraction of birds to the lake.

Nalbana Island is the core area of the Ramsar designated wetlands of Chilika Lake. Nalbana means *a weed covered island* In the Oriya language. It is a major island in the center of the lake and has an area of 15.53 km² (6.0 sq mi). The island gets completely submerged during the monsoon season. As the monsoon recedes in the winter, lake levels decrease and the island is gradually exposed, birds flock to the island in large numbers to feed on its extensive mudflats. Nalbana was notified in 1987 and declared a bird sanctuary in 1973 under the Wildlife Protection Act.

Rare birds reported in the lake are Asiatic Dowitchers (NT), Dalmatian Pelican (VU), Pallas's Fish-eagles (VU), the very rare migrant Spoon-billed Sandpiper(CR) and Spot-billed pelican (NT). The White-bellied Sea Eagle, Pariah Kite, Brahminy Kites, Kestrel, Marsh harriers, and the world's most widespread bird of prey, peregrine falcon, are among the raptors seen here.

Aqua fauna

As per the Chilika Development Authority's (CDA) updated data (2002), 323 aquatic species, which includes 261 fish species, 28 prawns and 34 crabs are reported out of which sixty five species breed in the lake. 27 species are freshwater fishes and two genera of prawns. The remaining species migrate to the sea to breed. 21 species of herrings and sardines of the family Clupeidae are reported. Between 1998–2002, 40 fish species were recorded here for the first time and following the reopening of the lake mouth in 2000, six threatened species have reappeared, including:

- Milk fish (Sebakhainga),
- Indo-Pacific tarpon (Panialehio),
- Ten pounder (Nahama),

- Bream (Kala khuranti),
- Hilsa (*Tenuealosa*) ilisha (ilishi) and Mullet *R. corsula* (Kekenda)

Commercial fisheries

For centuries fisher folk evolved exclusive rights of fishing through a complex system of partitioning the fisheries of the lake, harvested the lake in a relatively sustainable fashion and developed a large range of fishing techniques, nets and gear.

During the British rule, in 1897–98, fishermen community enjoyed exclusive fisheries rights in the lake. The fisheries of the lake were part of the Zamindari estates of Khallikote, Parikud, SunaBibi, MirzaTaherBaig and the Chaudhary families of Bhungarpur and the Khasmahal areas of Khurda, lying within the kingdoms of the Rajas of Parikud and Khallikote. The zamindars (Landlords) leased out the fisheries exclusively to the local fisherfolk.

Butter catfish and Wallagoattu are the most common type of fish found in the lake. 11 species of fish, 5 species of prawn and 2 crab species are commercially important. The commercially important prawn are Giant tiger prawn, *Penaeusindicus*(Indian white shrimp), *Metapenaeus Monoceros*(Speckled shrimp), *Metapenaeusaffinis* (Pink prawn) and *Metapenaeusdobson* (Kadal shrimp). Mangrove crab is the most important commercial crab. Fish landings in the lake, which fluctuated in the past, have recorded a remarkable recovery after the opening of the new mouth and dredging of silt –choked old mouth Magarmukh in 2000–2001, resulted in a better intermixing of the tidal influx from the sea and freshwater inflow from rivers.

Dolphins

The Irrawaddy Dolphin (*Orcaellabrevirostris*) is the flagship species of Chilika Lake. Chilika is home to the only known population of Irrawaddy dolphins in India¹ and one of only two lagoons in the world that are home to this species. It is classified as Critically Endangered, in five of the six other places it is known to live.

A small population of Bottlenose dolphins, also migrate into the lagoon from the sea. Chilika fishermen say that when Irrawaddy Dolphins and Bottlenose Dolphins meet in the outer channel, the former get frightened and are forced to return toward the lake.

After the opening of the new mouth at Satapada in 2000, they are now well distributed in the central and the southern sector of the lake. The number of dolphins sighted has varied from 50 to 170. A 2006 census counted 131 dolphins and the 2007 census revealed 138 Dolphins. Out of the 138 dolphins, 115 were adults, 17 adolescents and six calves. 60 adults were spotted in the outer channel followed by 32 in the central sector and 23 in the southern sector.

Dolphin tourism provides an important alternative source of income for many local residents. There are four tourist associations in Satapada employing three hundred and sixty 9-HP long-tail motor boats taking tourists to a 25 km² (9.7 sq. mi) area of the lake for dolphin watching. About 500 fishing families are involved in this business. The Orissa Tourism Department and the Dolphin Motorboat Association, an NGO at Satpada, report about 40,000 tourists visit Chilika every year for dolphin watching. October–January and May–June are the peak season for tourists

at Chilika, with a maximum 600-700 per day during December–January. The Dolphin Motorboat Association has 758-passenger motorboats for dolphin watching. Tourists pay Rs. 250 for 60–90 minutes per trip. According to the Association, most tourists see dolphins. Only 5% return disappointed. Besides the Association, the Odisha Tourism Department organizes "dolphin-watch" for tourists. Even during monsoon, about 100 tourists/day visit the lake.

Community Dependence on the Lake

Chilika Lake has 132 fishing villages with a total population of more than ten million not including the surrounding area which has about 273 villages. About 30% (33,300) of the fishing village population are active fishermen, although many others depend indirectly on the fisheries. The specific methods of fishing are a reflection of the particular caste characteristics of the community.

The complex mix of resources in and around the Lake, water, fish, land, forests and fauna, have an interrelated effect on community life. It is difficult to precisely arrive at a geographical area, and consequently, at the communities which should be included in a resource management plan for the Lake. More specifically, farm land, mostly paddy fields, is spread all around the Lake and irrigation water with pesticides like Thimet and Ecalux and fertilizers drain straight into the Lake. The forest area is spread over the entire western side up to 30 km distance, denudation of which for fuel and timber purposes add to the sedimentation of the Lake. Thus many communities, with very different socio-economic backgrounds, are one way or another linked to resources in and around the Lake.

Three distinct communities can be identified as having crucial linkages to the Lake and its resource management:

- The fishermen (traditional and non-traditional),
- The farmers who live around the lake, and
- Those who depend on the forest resources in the Lake catchment area for both their livelihood and to meet their fuel/timber requirements.

Traditional Fishermen: Their caste and status

The traditional fishermen are Harijans-the "Untouchables" and hence they occupy the lowest social position in the society. In addition, their poverty continues to reinforce this lower social position as, in the changing Indian village scenario, social status and economic power go hand in hand.

There are seven sub-castes of fishermen

Keuta(also known as Kaibarta or Khatia)-constitute 68% of the fishing population; generally fish only with nets.

Kandara-constitute 14% of the fishing population; operate traps like Dhaudi and Thattas for catching prawns and crabs;

Tiar-(also known as Ghadi) constitute 7%; generally use bamboo traps called bejas and menjhas;

Nolia- constitute 7%; Telegu fishermen who catch mainly marine fish and fish near the Lake mouth; use drag nets and cast nets;

Niary (Niaries)-constitute 2.3%; operate nets but do not use traps;

Gokha- constitute less than 1%; operate drag nets.

There is significant status differentiation between the sub castes primarily related to economic status. But between Khatia and Tiara there are only

marginal differentiations. While Khatias claim that they occupy the highest position, others challenge this. Kondras are the lowest of the sub-castes.

Forests

There is a large forest area both on the coastal side and around the lake which quote successfully is being covered by casuarina (near the sea shore), eucalyptus and cashew under both a SIDA-supported and the government's own social forestry programme. But the tribal and the local communities entirely depend upon the forest to meet their own fuel requirements and they also cut and sell it in the local market. Also, the tribals supply bamboo to the fishermen to make fishing tools and leaves to make leaf-plates. Fuel wood is in short supply and hence it provides employment to a large number of families. The number of families live exclusively on the forest. It was stated by the people that they have to go deeper and deeper into the forest as forests are getting cleared and denuded. It contributes to floods and sedimentation in the Lake. Hence, the forest is significantly linked to the Lake and the fishing community in many ways. The linkage between poverty and environment is quite obvious, for they said that they had to depend upon the forest for their livelihood and that given an alternate income source they would change their occupation. These relationships need to be further understood.

Thus, there is a need to intensify the forest and soil conservation programme and provide alternative income generation and energy sources for those who depend upon the forest for both livelihood as well as to meet the local energy requirement. The proper energy planning is essential.

Agricultural Land

The area around the Lake, not covered by human settlements and forest, is under intense farming-mainly cashew in dry land and paddy cultivation in wetland. Water from these farms, carrying fertilizer and pesticide residues, drain straight into the Lake. Moreover, the farming community, which is the most powerful economically, socially and politically, has taken over by force the lands around the Lake which have become dry due to the shrinkage of the Lake, and is bringing them under agriculture or aquaculture. These farmers have also taken to fishing, money lending (to fishermen) and fish marketing. This has led, on the one hand, to conflict between the traditional and the neo-fishing communities and, on the other hand, to the dependence of the fishing community on the non-fishing communities making the latter more powerful. This enables them to control the pricing of fish in their favour which keeps the fishermen poorer.

It was mentioned that the farmers in the western area took to fishing because of failure of crops due to flooding in the last ten consecutive years. The fishermen who had generated some surplus capital invested in farmland because of less catch of fish. The farmers were anxious to get back to farming if flooding could be controlled and adequate measures are made to ensure irrigation but the fishermen would like to continue with farming. The more fishing and prawn culture has become commercialized, the more farmers have entered the fish business.

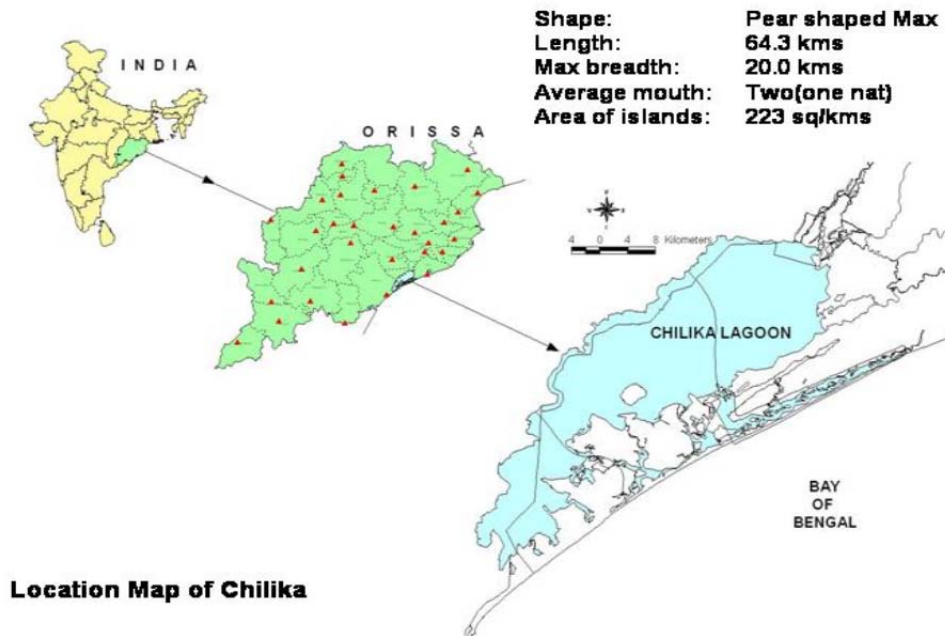
Thus, farming practices, the socio-economic profile of the farming communities and the dynamics of the relationship between the traditional

fishing and the "neo" fishing communities are important areas of inquiry. In-depth socio-economic studies need to be undertaken.

Opening of a new mouth

Following the recommendations of the CWPRS, an artificial mouth was opened on 23rd September 2000, which reduced the length of the outflow channel by 18 km. This is considered as historic in the restoration ecology. The opening of the artificial mouth and the desiltation of the lead channel not only rejuvenated the lagoon ecosystem but also immensely benefited the fisher folk whose average annual income increased by more than Rs. 50,000 per annum per family. This has resulted in the desired improvement of the salinity regime of the lagoon. Marked improvement in the fishery resources of the lagoon as the gradual reduction in the salinity from the lagoon mouth to the lagoon proper after the opening of the mouth is providing the desirable sense of direction for the euohaline forms to enter into the lagoon from the sea. This is facilitating the auto-recruitment of the fish, prawn, and crab juvenile into the lagoon resulting in remarkable improvement of the fishery resources.

Due to improvement of the salinity gradient there is phenomenal decrease of the fresh water invasive species by 172 sq kilometers and improvement of the sea grass bed. The improvement of the tidal flux has resulted in the better flushing of the sediment to the sea through the outlet channel. There is a significant improvement in the water level variation during the tidal cycle, which has turned the lagoon in to pulsing mode, thus making it more productive by nourishment with additional nutrient and flushing out of the detritus and waste products efficiently.



The hydrological interventions taken for the restoration of the lagoon have resulted in considerable improvement of its fishery resources, water quality, positive impact on the biodiversity and an overall improvement of the ecosystem of the lagoon. This has significantly contributed towards the increase in the per capita income of the community who depend on the lagoon for their livelihood. The increase in the productivity level both in the wetland as well as in the watershed due to the good environmental practices has facilitated the economic improvement of the community. The community participation, linkage with the various national and international institutions, intensive monitoring and assessment system are some of the uniqueness of the management practices adopted by CDA for restoration of

this unique wetland. The restoration approach of CDA is considered as most appropriate and unique in the history of restoration ecology.

Malud

Total Number of HouseHold : 675			
Population	Persons	Males	Females
Total	3,222	1,686	1,536
In the age group 0-6 years	337	177	160
Scheduled Castes (SC)	1,355	694	661
Scheduled Tribes (ST)	0	0	0
Literates	2,377	1,364	1,013
Illiterate	845	322	523
Total Worker	1,038	834	204
Main Worker	421	373	48
Main Worker-Cultivator	54	52	2
Main Worker-Agricultural Labourers	17	17	0
Main Worker-Household Industries	21	16	5
Main Worker-Other	329	288	41
Marginal Worker	617	461	156
Marginal Worker-Cultivator	65	61	4
Marginal Worker-Agriculture Labourers	371	257	114
Marginal Worker-Household Industries	8	4	4
Marginal Workers-Other	173	139	34
Marginal Worker (3-6 Months)	488	365	123
Marginal Worker-Cultivator (3-6 Months)	63	59	4
Marginal Worker-Agriculture Labourers (3-6 Months)	342	241	101
Marginal Worker-Household Industries (3-6 Months)	8	4	4
Marginal Worker-Other (3-6 Months)	75	61	14
Marginal Worker (0-3 Months)	129	96	33
Marginal Worker-Cultivator (0-3 Months)	2	2	0
Marginal Worker-Agriculture Labourers (0-3 Months)	29	16	13

Marginal Worker-Household Industries (0-3 Months)	0	0	0
Marginal Worker-Other Workers (0-3 Months)	98	78	20
Non Worker	2,184	852	1,332

Gopalpur

Total Number of Household : 198			
Population	Persons	Males	Females
Total	985	510	475
In the age group 0-6 years	99	48	51
Scheduled Castes (SC)	88	47	41
Scheduled Tribes (ST)	0	0	0
Literates	775	433	342
Illiterate	210	77	133
Total Worker	418	278	140
Main Worker	223	210	13
Main Worker-Cultivator	115	114	1
Main Worker-Agricultural Labourers	69	65	4
Main Worker-Household Industries	0	0	0
Main Worker-Other	39	31	8
Marginal Worker	195	68	127
Marginal Worker-Cultivator	10	5	5
Marginal Worker-Agriculture Labourers	179	60	119
Marginal Worker-Household Industries	2	0	2
Marginal Workers-Other	4	3	1
Marginal Worker (3-6 Months)	189	65	124
Marginal Worker-Cultivator (3-6 Months)	8	4	4
Marginal Worker-Agriculture Labourers (3-6 Months)	175	58	117
Marginal Worker-Household Industries (3-6 Months)	2	0	2
Marginal Worker-Other (3-6 Months)	4	3	1
Marginal Worker (0-3 Months)	6	3	3
Marginal Worker-Cultivator (0-3 Months)	2	1	1

Marginal Worker-Agriculture Labourers (0-3 Months)	4	2	2
Marginal Worker-Household Industries (0-3 Months)	0	0	0
Marginal Worker-Other Workers (0-3 Months)	0	0	0
Non Worker	567	232	335

General Information on Puri

AREA	3,051 Sq.Km.	POPULATION	14,98,604
SUBDIVISIONS	1	LITERACY RATE	78.40%
TOWNS	4	HEADQUARTERS	Puri
POLICE STATIONS	21	VIDHAN SABHA SEATS	6
BLOCKS	11	VILLAGES	1,714
TAHASILS	5	FIRE STATIONS	NA
N.A.C	3	FOREST	137.10Sq.Km.
GRAM PANCHAYAT	204	TEMPERATURE	36.2(Max), 13.3(Min)
MUNICIPALITY	1	RAINFALL	1586.1mm(Avg)

SUBDIVISIONS

Puri

TAHASILS Krushnaprasad, Nimapada, Pipili, Puri, Kakatpur Purisadar, Pipili, Delanga, Kanas, Nimapada,
BLOCKS Kakatpur, Astaranga, Brahmagiri, Krushnaprasad, Satyabadi, Gop