DEVELOPMENT PLANNING OF PURI CITY UNDER THE ECOCITY PROJECT

A DISSERTATION

Submitted in partial fulfillment of the requirements for the award of the degree of

MASTER OF URBAN AND RURAL PLANNING

By

BIBHU PRASAD TRIPATHY

DEPARTMENT OF ARCHITECTURE AND PLANNING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE - 247 667 (INDIA)

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CANDIDATE'S DECLARATION

I hereby declare that the work which is being presented in this dissertation titled **"Development Planning of Puri city under the Ecocity Project"** in partial fulfillment of the requirement of the award of the degree of Master of Urban and Rural Planning submitted in the Department of Architecture and Planning, Indian Institute of Technology Roorkee is an authentic record of my own work carried out during the period from July 2007 to June 2008 under the supervision of **Prof.R.Shankar,** Department of Architecture and Planning, Indian Institute of Technology Roorkee.

The matter embodied in this dissertation has not been submitted by me for the award of any other degree.

Bibhu Prasad Tripathy..

Dated: 15 June 2008 **(Bibhu Prasad Tripathy)**

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

R. K

(Prof.R.Shankar)

Department of Architecture and Planning

Indian Institute of Technology, Roorkee

Roorkee - 247667

Dated: 15 June 2008 Uttarakhand, India

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EXECUTIVE SUMMARY

According to the UN estimates 60 % of the world's population would be living in urban settlements by the year 2030 and according to the 2001 census report India has 35 million plus cities across the country. These urban settlements are gargantuan scaled energy guzzlers which need energy for their mere sustenance.

In India the small and medium scaled towns have been increasing their sizes and numbers, albeit in an unplanned and chaotic fashion. This breeds unhygienic conditions and has adverse effects on the environment as well. To deal with this the Central Pollution Control Board with the support of World Bank and the Government of Germany has planned to prepare environment improvement plans for some cities across India under an Ecocity Project for redevelopment and regeneration of the existing urban settlements. In the first phase six cities have been taken namely Vrindavan, Ujjain, Puri, Tirupati, Kottayam and Thanjavour. The various environmental aspects that could be covered under the Ecocity project include – *Urban sanitation, drainage, sewerage, solid waste disposal, traffic management including parking, improvement of urban design quality and tourist facility planning.* For this a budget of Rs.150 million has been sanctioned for the period of 2002 – 03 to 2006 – 07 which is to be used as the seed money.

This dissertation has taken Puri as the study area and attempts to prepare an environment improvement plan dealing with some of the above mentioned points into consideration. Puri is a coastal town in the eastern side of the Indian peninsula. Located in the state of Orissa the town is one of the most important religious centers in India. In Orissa out of the total population of 36 706 920 as on 1st March 2001 31 210 602 live in rural areas and 5 496 318 in urban areas. The net addition of population in rural areas during 1991 -2001 has been 3685399 while in the urban areas it is 12 61 785. Although the population of the city is still less than 0.2 million it has to welcome about 5 million visitors and pilgrims throughout the year on an average. The world renowned Ratha Yatra of Lord Jagannath alone draws around 5 – 6 lakh population. All this puts a heavy pressure on the existing infrastructure of the city and creates a resource crunch. This calls for a concerted effort so that not only the resources are intelligently and efficiently utilized but also the urban chaos could be minimized.

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INTRODUCTION

Rapid urbanization has pushed the world to the brink of energy crisis. The growing numbers of small and medium scaled cities is also a result of this urbanization only. What is more serious is the haphazard and unhygienic growth of these cities. There is a need to plan the growth of these settlements in such a way that it is not only hygienic but also self sustaining.

At the wake of this there has been an effort by the Central Pollution Control Board of India to regenerate such cities for which they have started the Ecocity project. The city of Puri has been identified as one of such cities. The author defines the aim of the study, scope and limitation and the methodologies for the studies in this chapter.

1.1 Introduction

The world's urban population has been growing rapidly. According to UN estimates over 60 percent of the world's population will be living in the urban areas by the year 2030. India's urban population is 285.3 million according to 2001 census which is 27.8 percent of the total population. India has 35 million plus cities among which 3 are with a population of 10 million and above while 3 other have over 5 million. Going by this rate India will have the greatest concentration of mega cities by the year 2021.

These urban settlements are gargantuan scaled energy guzzlers and also throw up huge quantity of pollutants back to the environment. Hence it becomes imperative to think about settlements which are not only self sustaining but are also environment friendly, in the wake of issues such as global warming.

1.2 Environment condition of small and medium size tourist centers / towns of India

The small and medium size tourist centers/ towns of India face some similar kind of environmental problems these days. Most of them are unplanned and breed unhygienic conditions while at the same time are not developed in a sustainable way. Lack of hygiene in public places is a common feature in these towns/ centers. Unavailability of public facilities, chaotic traffic as well as pollution also makes situations much grimmer. Hence it calls for a concerted effort in the light of physical and social planning.

1.3. The Project background

The Central Pollution Control Board conducted pilot studies for urban areas under the World Bank funded Environmental Management Capacity Building Project and supported by the GTZ-CPCB Project under the Indo-German Bilateral Program.

Using the experiences from the pilot studies conducted for urban areas, the Ecocity program was conceptualized for improving environment and achieving sustainable development through a comprehensive urban improvement system employing practical, innovative and non-conventional solutions.

A budget provision of Rs. 150 million was made for the period 2002-03 to 2006-07 for the Ecocity projects. The towns/cities being covered under the Eco-city Project have been selected based on the following criteria:

- Size of the town/city (less than 5 lakhs population)

- Cultural/historical/heritage/tourism importance
- Environmental Improvement needs
- Scope for public-private partnerships and private investment
- Generators of economic momentum/urbanization
- Public participation in decision-making process
- Regional distribution of towns

1.4 Towns Covered under the 1st Phase:

On the criteria listed as above six medium sized cities had been selected for the preparation of environment improvement plans which are as follows ***Vrindavan, Ujjain, Puri, Tirupati, Kottayam and Thanjavour***. An eco development plan is being prepared for the pilgrim town of Vrindavan.

It is envisaged that the selected cities would prepare environmental improvement plans utilizing the limited funds as seed money and opportunity for undertaking sustainable environment improvement schemes.

The various environmental aspects that could be covered under the Ecocity project include –

- Urban sanitation
- Drainage
- Sewerage
- Solid waste disposal
- Traffic management including parking
- Improvement of urban design quality
- Tourist facility planning

Puri city has been taken as the study area because of the proximity of the place from the hometown of the author.

1.5 Aim of the Study

This study aims to prepare an action plan for the environment improvement of Puri city within the scope of Ecocity project.

1.6 Objectives of the Study

The objectives framed for the investigation are as follows:

- To study the various planning developmental and environmental problems of Puri city in the context of tourism scenario
- To analyze traffic and other important infrastructural problems related to tourism and formulate priorities.
- To prepare environmental improvement plan for Puri city dealing with traffic management and other important tourist facilities.
- To recommend strategies for making environmental improvement schemes self sustainable.

1.7 Scope and limitations of the Study

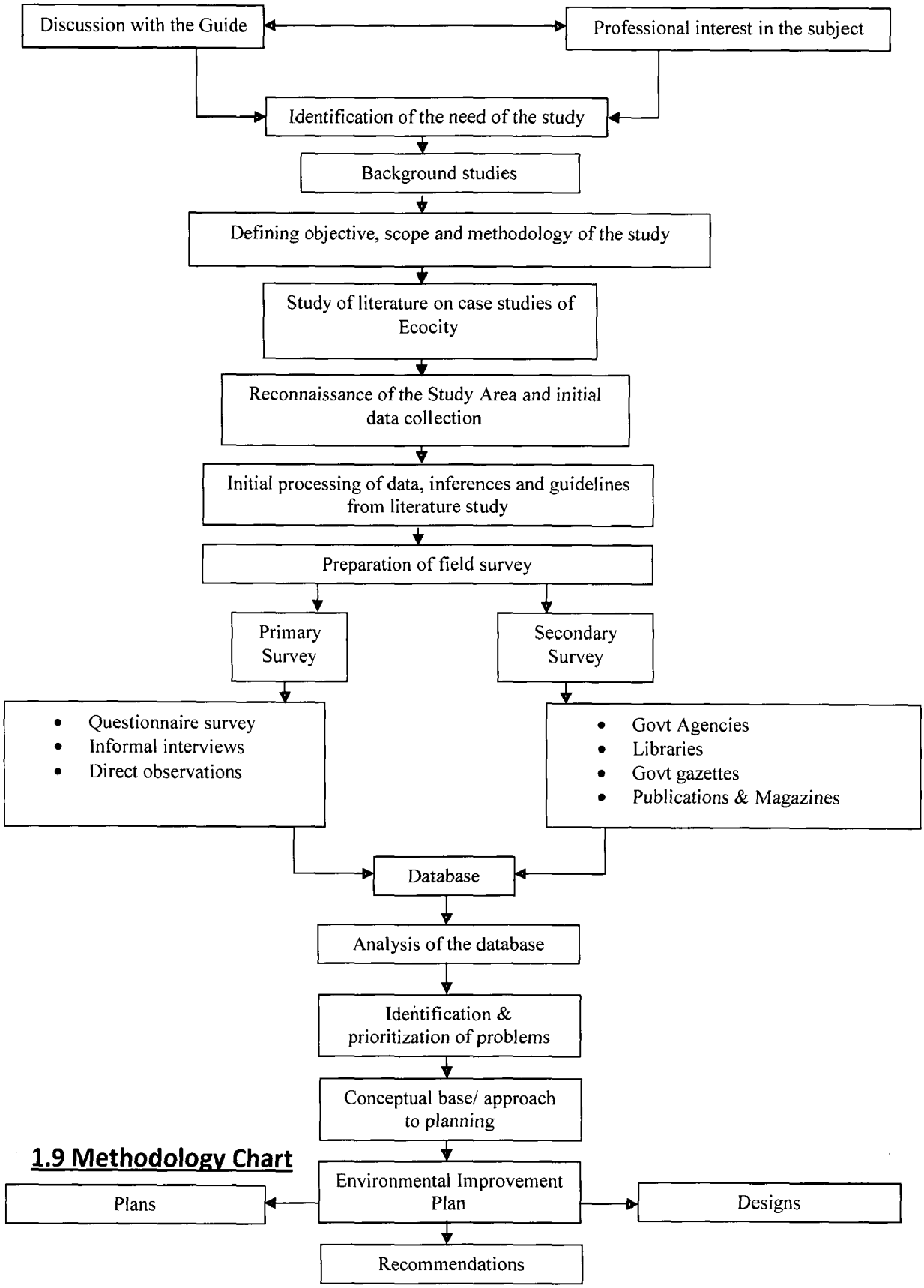
Although the scope of the Ecocity project covers various aspects (please refer section 1.4) and may also deal with the entire city that comes in the purview of the municipality the scope of the study herein would cover only certain areas (please refer section 3.1.6) . The study would cover a particular delineated area and not the water bodies' existing per se.

The scope of the study would include the improvement of the architectural/ urban design quality including the overall environmental quality along with the provision of public facilities. The study would also address traffic related problems of that of parking, signage, traffic movement and traffic management.

The data for study analysis will be limited to various secondary sources and those feasible under time & resource availability.

1.8 Methodology for Studies

1. Extensive literature study to understand the concept of Ecocity and sustainable development. Case studies to understand the nature and quality of the work that are already under way.
2. Collection of various secondary data from government and non government bodies about census statistics, developmental works already undertaken, statistics on tourism etc.
3. Field surveys of the study area to gain a first hand knowledge of the existing conditions and potentials of the region
4. Analysis of the data through statistical methods and presentation of the analyzed data and report through various computer softwares.
5. Formulation of plan basis and preparations of proposals.



1.9 Methodology Chart

2

CASE STUDIES

Under the Ecocity project some works have already been done for two cities which are Tirupati and Vrindavan. The author makes a study of these works considering their resemblance to the study area with respect to the character, size and population of the settlements. Apart from these two the author also makes a study of the various research and development projects by Sulabh International, a non – government body working towards the improving sanitation and hygiene. The idea of this case study was to incorporate some of these projects into the study area.

2.1.1 Tirupati

Tirupati is a pilgrim center having a population of 228,000 and has over 20 million visitors annually. Tirupati, located at about 580 km from Hyderabad (capital city of Andhra Pradesh) and 137 km from Chennai (capital city of Tamil Nadu), is evolving into one of the most prominent nodes of the Rayalseema region of Andhra Pradesh with its pilgrim importance, educational institutions, health care facilities and industries. It is the gateway to Tirumala, the abode of Lord Venkateswara.

Figure 2. 1: Shrine of Tirupati

Image source: http://www.ecocitiesindia.org/

The Ecocity Project in Tirupati covers the core area of the town, which attracts tourists and pilgrims, including Govindaraja Swamy Temple from 12th Century AD [refer figure no.1], railway station, bus terminus, old residential area, hotels and schools. The core area, at the start of the Ecocity Project, had a number of problems related to

environmental quality, traffic & transportation, sewerage & drainage and solid waste management.

The main results expected to be achieved under the Ecocity Project are:

- Revival of Koneru and its surroundings [refer figure no.2]
- Improved sanitary conditions including efficient solid waste management and drainage system
- Improved environmental quality
- Improved traffic & transportation system including pilgrim/tourist friendly routes
- Organized informal sector
- Availability of trained manpower in the Tirupati Municipal Council on the issues related to urban management including waste management, waste water management.

An "Ecocity Development Plan" has been prepared for the identified project area though the GTZ Consultants (School of Planning & Architecture, JNTU, Hyderabad). A number of project interventions, such as the following, are proposed for implementation:

- Replenishment of water in Koneru with improved surroundings
- Improved sanitation including storm water drainage and solid waste management
- Improving traffic & transportation system including pedestrian zones, parking facilities, signage etc.
- Providing public toilets and drinking water facilities
- Development of ornamental landscaping
- The above projects are at various stages of planning, designing and implementation.

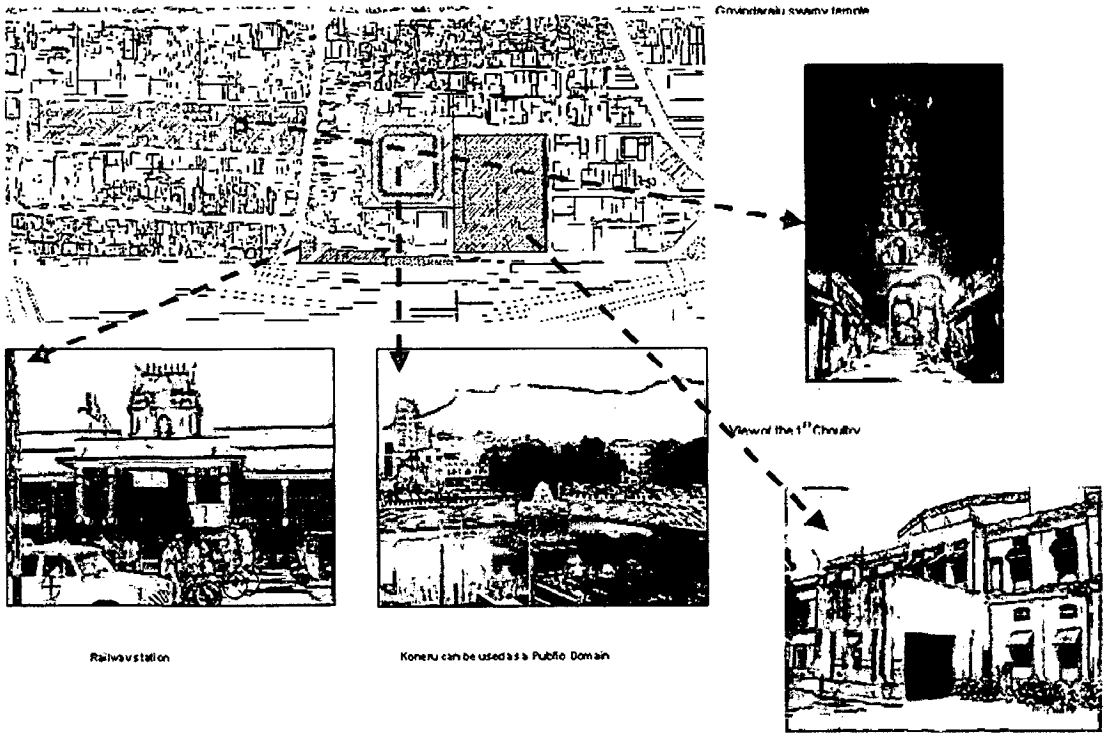


Figure 2. 2: Map showing Koneru with surroundings

Image source: http://www.ecocities-india.org/

2.1.2 Improvement of Storm Water Drainage System

a) Covering of storm water drains using granite stones

For the purpose of assessing the situation of drainage system at the start of the Ecocity project, the road stretches of the entire core area have been codified into 34 stretches. The status of drainage system has been accordingly classified. Almost 97% of the entire core area has storm water drains except for the Govindaraja Swamy Temple Street. Steps and other structures have been haphazardly constructed over the drains to enter into the houses or shops that are on road side thereby posing ugly streetscape. The storm water drains [refer figure no.3 & 4] in only five of the stretches are completely covered (about 15%). The storm water drains in the rest of the stretches are either partly covered (about 17%) or covered but have holes (about 29%). Most of the drains are stagnant with silt and garbage thrown in them. The stagnant drains pose severe sanitation problems and health risks. Also, they pose risks of overflow and flooding in the rainy season. Due to unsanitary conditions

posed by these storm water drains, about 0.9 m to 1.5 m space by the side of the drains was practically being unused thereby reducing the width of the road.

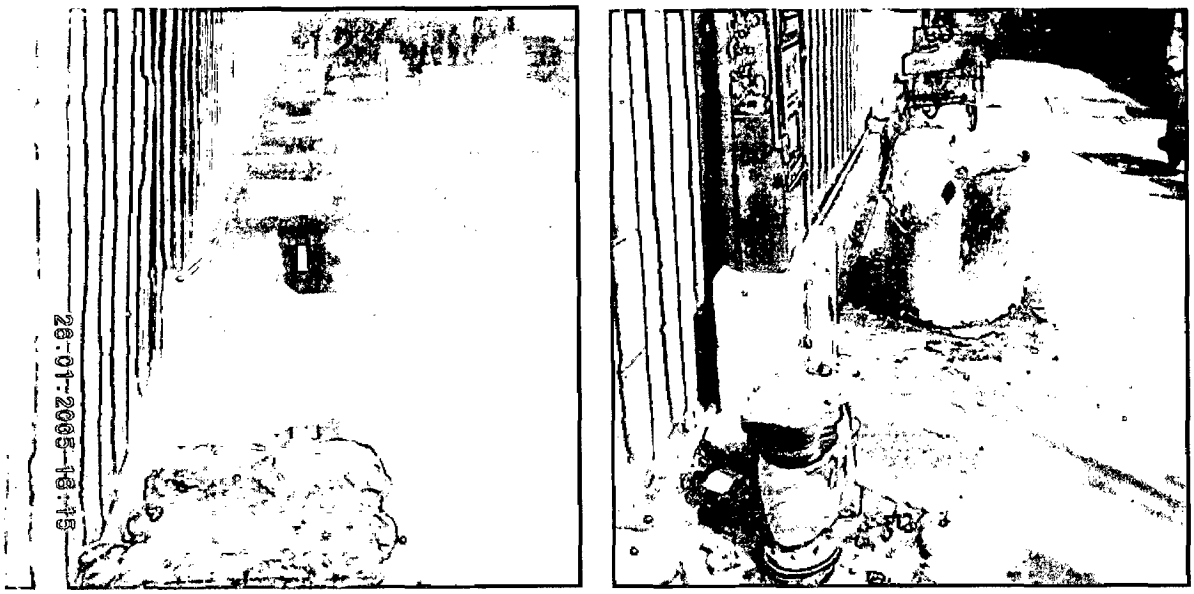
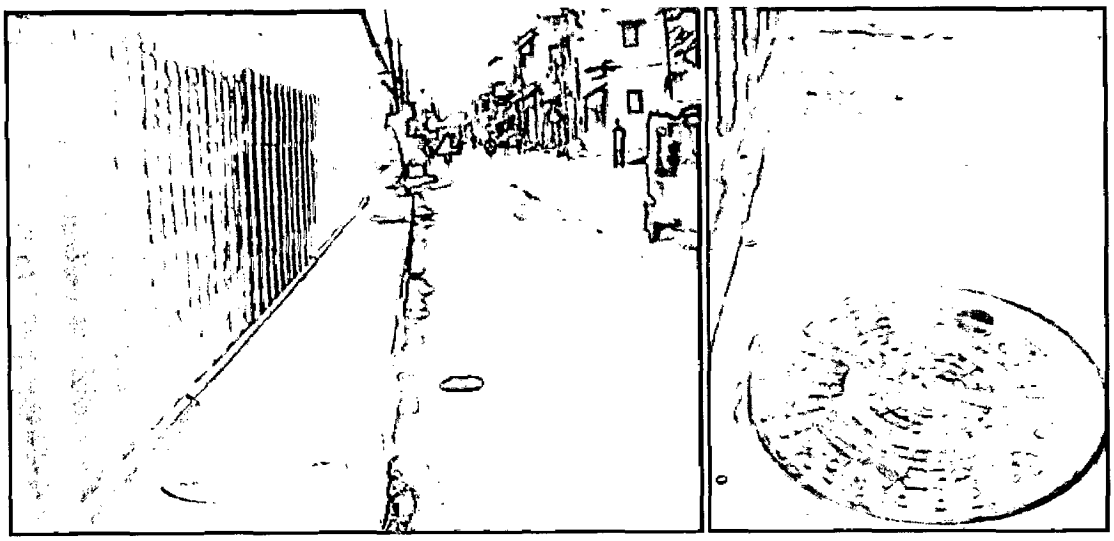


Figure 2. 3: Condition of storm water drains (before)

Image source: http://www.ecocities-india.org/



b. Implementation

The core area generates garbage of about 27 tons per day. There was no proper MSW management system in place before the start of the Ecocity project. There was no door-to-door collection and the solid waste was dumped in and around the cement bins that were placed at frequent distances on the road side [refer figure no.5]. At many places, these bins were obstructing the traffic movement and also were becoming a source of nuisance due to dumping of garbage all around them. These bins with strewn garbage were attracting stray animals and also clogging the drains due to waste spills. With the authorization issued by the Tirupati Municipal Council, an agreement had been entered into with an NGO (M/s SCHWEP) and door-to-door collection & segregation of municipal solid waste commissioned in the streets of Kaghithal Veedhi, North Mada Street and South Mada Street catering to about 300 households.

The Tirupati Municipal Council provided two color coded bins (green bin for dry waste and red bin for wet waste) to the residents of Kaghithal Veedhi, North and South Mada Streets for waste segregation at source. CEE had taken up the task of motivation and educating the people on segregation of wastes with a special campaign that was started on 15th August 2005 (Independence Day of India). The segregated waste is collected door-to-door in a tricycle containing green and red bins by the waste collectors of the NGO (SCHWEP). The waste collector's salary is paid by the residents @ Rs 10/- to Rs 15/- per household or shop per month. The collected wastes are finally transported to the centralized waste disposal facility. The above system has lead to removal of garbage bins that were a source of nuisance on the streets. There is reduced littering on the roads and reduction in the garbage finding its way into the open drains [refer figure no.6]. An economically sustainable system entailing door-to-door household segregation, collection, and disposal and recycling of waste has been established. With the positive results from the first phase that covered about 300 households, it has now been decided to extend the system to the entire core area covering about 1,600 households and about 1,500 shops.

Figure 2. 5: Solid waste in the core area (before)

Image Source: http://www.ecocities-india.org/

Figure 2. 6: Cleaner streets after cleanliness drive

Image Source: http://www.ecocities-india.org/

2.1.4 Recycling and Reuse

a. Vermi composting

The wet waste collected from the segregated waste from the 3 streets in the Ecocity project area is being sent to the vermi-composting site located outside the core area at Thondavada. The wet waste is converted into compost. The compost so formed in the vermi-composting unit is sold at a shop set up by the NGO (SCHWEP) in Bandla Street, at the rate of Rs. 2.50 per kg to farmers and @ Rs. 3 per kg to other people. Besides this,

the vermin-culture is also being sold to the farmers along with the compost to augment the fertility of the soil @ Rs. 50 per kg.

b. Manufacture of paper bags from waste paper and used newspapers and re-use of waste polythene bags

Twenty women have been identified by the selected NGO (PEN India), under the aegis of CEE [Small Grants Program of Global Environment Facility (UNDP-GEF-SGP)] for making paper bags from waste paper and used newspapers [refer figure no.7]. These bags are marketed through the shops at Gopuram Lane at Govindaraja Swamy Temple and are looking for other marketing possibilities. The space for establishing the facility has been provided by the Tirupati Municipal Council. For enabling recycling of waste plastic bags, a loom has been installed and the women trained by an NGO (PEN India) on making bags out of the waste plastic bags, using loom. Strips of about 2 cm are made from the waste bags of black and white color and using thread these are weaved to make bags of different sizes. The women are fully trained in making these products.

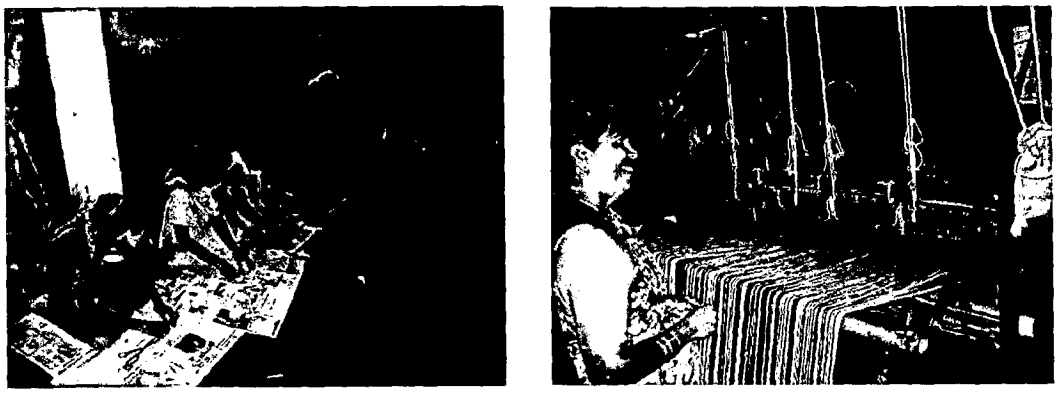


Figure 2. 7: Women making bags from polythene bags and used newspapers

Image source: http://www.ecocities-india.org/

2.1.5 Improving Traffic and Transportation System

a. Development of parking facilities

The core area of Tirupati is the central district of the town, characterized by densely built up areas and congested narrow streets, heavy flow of traffic and busy retail trade along the streets.

The core area has several activities that generate large volumes of traffic. These include bus stand, railway station, fruit and flower market, police station, post office, banks, seven cinema theatres, colleges, schools, lodges, restaurants, shopping streets. The surveys conducted, as a part of preparation of Ecocity Development Plan, proclaimed the need for a parking facility to cater to different types of vehicles in the core area as currently there is inadequate parking space.

Through the GTZ Consultants (School of Planning & Architecture, JNTU, Hyderabad), designs have been developed for the Multi-storied Parking Facility that would be located in the core area. The parking facility would be in five floors including a cellar and a sub-cellar. The facility would accommodate about 229 cars. The facility would have amenities such as toilets, food joint, travel desk and rest room for drivers. The site would have rain water harvesting system and plantation.

b. Widening of approach road to railway station

For facilitating improved traffic & transportation system, the approach road is being widened by the Tirupati Municipal Council by removing existing structures. The project is funded by the Tirupati Municipal Council and the Tirumala Tirupati Devastanam (TTD). The negotiations for demolition of existing buildings have been completed by the municipality and the work is expected to be complete during the year 2006.

c. Pedestrianization of Koneru surroundings

Koneru, the historic religious tanks had reduced use at the start of the Ecocity project due to encroachments, lack of adequate water and pollution. About 100 vehicles, mostly taxis get parked in the area on the road surrounding Koneru. Also, solid waste from the hotels is dumped in the area and improper drainage system is leading to pollution of Koneru. Due to prevailing conditions, Koneru has limited environmental function and limited visitors. The plan mainly includes:

- Pedestrian pathway around Koneru with stone flooring followed by 3.65 m wide service road [refer figure no.8]
- Complete removal of existing parking of taxis and other vehicles from the area
- Plantation and ornamental landscaping
- Urban design structures, street furniture

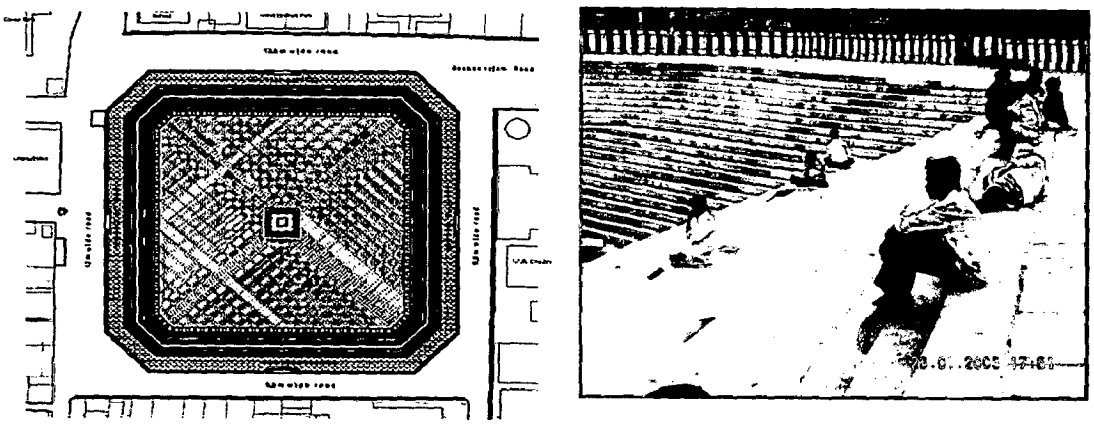


Figure 2. 8: Koneru & proposed pedestrianization

Image source: http://www.ecocities-india.org/

2.1.6 Toilets and Drinking water facilities

a. Public toilets

Tirupati gets about 50,000 pilgrims everyday. Due to lack of adequate public conveniences, open defecation and urination is observed. To start with, three toilets are proposed for construction at strategic points, in addition to the 3 existing toilets in the railway station, bus stand and the proposed one at the multi-storied parking facility. These 3 proposed toilets would be located near Koneru, near railway station and near the Andhra Pradesh State Road Transport Corporation (APSRTC) bus stand.

The toilets project includes:

- Separate provisions for gents, ladies and physically handicapped
- Landscaping in front of the toilets
- Solar power is integrated
- Granite stone exteriors to match with the character of the area
- Water recycling arrangements for gardening
- Provision for caretaker and tourists' luggage

- The construction of toilets would be taken up on build own operate-transfer (BOOT) basis.

b. Drinking water facilities

Public drinking water supply points that are clean and provide safe water are not adequately available in the project area. Under the Ecocity project, drinking water hand pumps would be initially developed at three places, viz. near Govindaraja Swamy temple, near railway station and near bus stand.

The highlights of the project are:

- Includes water cooler
- Separate provision for physically handicapped and children
- Landscaping in front of the drinking water facilities
- Appropriate designs to avoid blocking of water outlets
- Self closing taps to avoid wastage of water
- Granite stone exteriors to match with the character of the area
- Water recycling arrangements for gardening

2.1.7 Generation of public awareness and assuring community participation

a. Cleanliness Drive

A one month long cleanliness drive, supported by GTZ, was launched in the core area of Tirupati on December 18, 2005 under AAWaM Project for achieving 100% satisfaction on removal of garbage and cleaning of storm water drains and in creating the needed awareness among the local residents. During the drive, community bins were procured and grouted at strategic locations for use by people and safety items (aprons, rubber boots, rubber gloves, face masks, soaps, caps etc.) were provided for workers.

The cleanliness drive could bring in visible improvement in sanitation in the core area. Further, with the willingness shown by the residents, the Tirupati Municipal Council had decided to extend the door to door waste collection system to the entire core area covering about 1,600 households and about 1,500 shops.

b. Awareness and community programs

A number of awareness and education programs including rallies, competitions for students from schools, street plays, publishing of calendars/pamphlets and conducting of cleanliness drive were undertaken. The main activities taken up are:

- Competitions for school children – painting, debate etc.
- Street plays (Nukkad Natak) at various locations in the core area
- Enactment of "Chintamani", a popular Telugu stage play
- Regular motivation and persuasion for achieving waste segregation in the Kaghithal Veedhi, North and South Mada during waste collection
- Persuasion with local residents to lodge complaints against problems related to drainage, sanitation and public water supply
- Environmental awareness rallies
- World Environment Day events including shramdaan and cleanliness drive.

2.1.8 Inferences from the case study

After making the case study of works done in the Ecocity project of Tirupati several inferences could be drawn. They can be summed up as follows:

- ✓ Focus should be given on a particular area (areas preferably most frequented by visitors).
- ✓ Emphasis should be given on rejuvenating the existing infrastructure wherever possible. This greatly reduces the cost.
- ✓ Materials that are locally available when used for the construction purposes greatly reduce the cost and blends with the surroundings as well.
- ✓ For the implementation of solid waste management system, it is highly imperative to educate the residents about the effects of ill maintained garbage. Door – to – door collection should be given emphasis and the cost could be bore collectively by the residents.
- ✓ The garbage produced could be recycled. Waste newspaper and plastic bags which form a bulk of the garbage can be recycled to make fresh bags and other items. This could possibly be a source of employment to a part of the dependent population especially.
- ✓ Stress should be given on pedestrianization of core areas wherever there is a mass movement. In other words, the movement should be controlled wherever there is a large flow of visitors.

- ✓ Approach roads for mass transportation such as railway stations and bus stands should be broadened. At the same time it is essential to control the movement of private vehicles, taxis and rickshaws and give more focus on public transport such as town bus, shuttle service etc.
- ✓ Commercial institutions such as hotels and restaurants which are invariably there in core areas and are big sources of pollution should be regulated and shifted out of those areas wherever possible.
- ✓ Areas with public interest such as parking lots and pedestrian paths should be punctuated with ornamental landscaping, urban structures and public utilities.
- ✓ Public toilets should be provided at strategic points such as bus stands, railway stations and other areas most frequented by tourists. The toilets' construction could be on a build – own – operate – transfer (BOOT) basis, while the maintenance could be on a pay and use basis.
- ✓ Emphasis should be given that the public utilities should be low cost and vandal proof.
- ✓ Street plays and awareness programs should be conducted by the municipality along with the non government organizations of the area in order to impart education to the masses.

2. 2 Vrindavan

Figure 2. 9: Temple in the banks of Yamuna River

Image source: http://www.ecocities-india.org/

Vrindavan, situated on the banks of river Yamuna, has been a center for spiritual learning for hundreds of years. Legends of Krishna and Vrindavan's historic past are stamped on the thousands of temples here and have people coming from all over the world. The Ecocity Project area in Vrindavan includes the old part of the town covering tourist/religious places including surroundings of Ranganathji Temple and Sri Banke Bihari Temple, river front of Yamuna [refer figure no.9], commercial areas and old residential areas. The project area, at the start of the Ecocity Project, had a number of problems related to environmental quality, traffic & transportation, sewerage & drainage and solid waste management.

The main results expected to be achieved from the Ecocity Project are:

- Improved sanitary conditions including solid waste management and drainage system
- Improved traffic & transportation system including pilgrim/tourist friendly routes
- Improved religious/tourism function in the area
- Improved environmental quality
- Trained manpower in the Vrindavan Nagar Palika Parishad on the issues related to urban management including waste management and waste water management.

An "Ecocity Development Plan" has been prepared for the identified project area though the GTZ Consultants (Department of Architecture and Regional Planning, IIT, Kharagpur). A number of project interventions, such as the following, are proposed for implementation:

- Redevelopment of Parikrama Marg
- Improvement around Banke Bihari temple
- Restoration/redevelopment of Gandhi Park
- Improvement along the roads starting from Vrindavan Nagarpalika via Rangnathji Temple to Banke Bihari Temple including road surface improvement, storm water drainage, parking, street lighting, signage etc.

The above projects are at various stages of planning and designing.

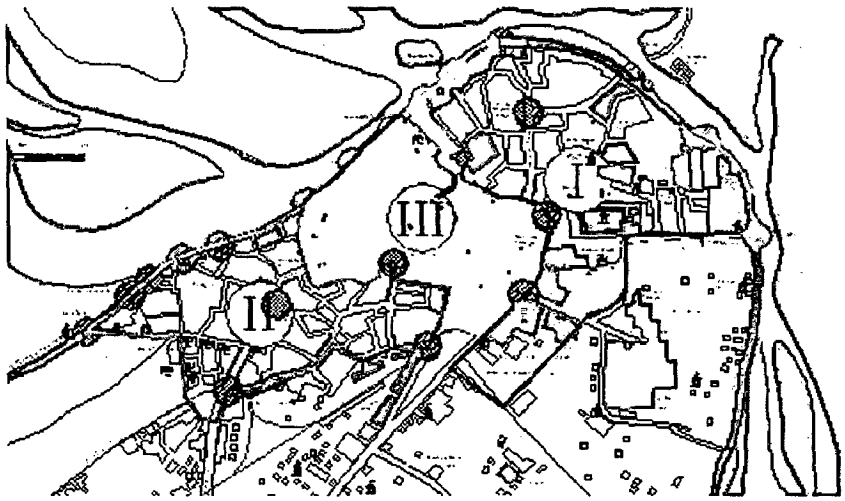


Figure 2.10: Map showing the Parikrama Marg

Image source: http://www.ecocities-india.org/

2.2.1 Establishment of economically and environmentally sustainable solid waste management system

Proper system of municipal solid waste management is not yet established in the Ecocity Project area of Vrindavan. However, a number of initiatives have been taken up

for rekindling of the faith of common people in the earnestness of the Vrindavan Nagarpalika Parishad in making Vrindavan a cleaner and healthier place for people to live in. Details are given below:

a. Night cleaning drive

Another initiative taken by the Vrindavan Nagar Palika Parishad to clean the core area of Vrindavan is the 'night cleaning' (Raatrikaleen Safai) on Goverdhan Road and the areas adjoining Shri Banke Bihari Temple. This exercise is being carried out on a daily basis during night hours in collaboration with voluntary organizations. The waste aggregated from night cleaning is collected in the morning by handcarts and sent to the dumping ground using tractors.

b. Procurement of Community Bins

The Vrindavan Nagar Palika Parishad procured 30 nos. of dust bins of 50 liter capacity and in addition nos. 50 of 60 liter capacity bins and 50 nos. of 110 liters capacity bins were procured by GTZ. These bins have been placed in the Ecocity Project area. The bins have been specially manufactured with arrangements for grouting in the ground for firmly fixing them.

c. Procurement of Tricycles for Waste Collection

Tricycles (20 nos.) were acquired by the Vrindavan Nagar Palika Parishad to collect the garbage from various areas in the Vrindavan Ecocity Project area.

2.2.2 Achieving comprehensive improvement

a. Redevelopment of the Parikrama Marg

The Parikrama Marg is 11 km long stretch used by people to circumambulate the main pilgrim sites in Vrindavan. The devotees walk barefooted all around the Parikrama Marg. Especially on Ekadashi, the number of pilgrims using the Parikrama Marg is enormous. However, the Parikrama Marg has poor road surface, especially unsuitable for pedestrian movement. Also, the stretch lacks proper drainage system, shaded trees and amenities such as toilets and drinking water are not adequately provided.

The India Heritage Foundation has come forward to fund, plan, implement and operate the improvement of Parikrama Marg. Initial efforts would be for a 2 km stretch of Parikrama Marg from Kaliadaha Ghat to Kesi Ghat. The project aims to equip the Parikrama Marg with necessary infrastructure to support the large inflow of tourists in an environmentally friendly manner. The project includes interventions related to traffic & transportation, urban design & landscaping, public facilities & utilities, waste water management, solid waste management and heritage conservation [refer figure no.11].

The planning for the 2 km stretch is in advanced stage by The India Heritage Foundation.

Figure 2. 11: Images showing the proposals along the Parikrama Marg

Image source: http://www.ecocities-india.org/

b. Comprehensive improvement along the road starting from Vrindavan Nagar Palika via Rangnathji Temple to Banke Bihari Temple Area

The stretch from Vrindavan Nagar Palika via Rangnathji Temple to Banke Bihari Temple area has a number of pilgrim sites. On an average 20 to 30 buses visit the place everyday. The area has various modes of traffic including buses, cars, cycle rickshaw, bicycles and Tongas. The area lacks adequate parking facilities, has poor road surfaces, the roads are not pedestrian friendly and lacks proper drainage system and shaded trees and amenities such as toilets and drinking water are not adequately provided.

The proposal includes:

- Improvement of road from Nagar Palika to Rangnathji temple with separate stone pitched pedestrian pathways, separate vehicular way, improved round about at Rangnathji temple, cycle rickshaw lanes, plantation, drainage system, signage, sitting benches, parking facilities for tourist vehicles and rickshaws, dust bins, rainwater harvesting and a small tourist information centre.
- Improvement of the other stretches with proper road surface wherever necessary, drainage system, signage, parking facilities, drinking water, street lighting and dustbins.
- The architecture of the tourist information centre and the drinking water facility would have Vraja character, by using similar architectural features and materials to blend with the surroundings. The pedestrian pathways would be of stone materials viz. Manadana stone and Bansipaharpur stone and Budhpura stone.

c. Restoration/Development of Gandhi Park

The original core area of the Vrindavan was once full of vegetation harboring trees like Tulsi, Kadamba, and Tamaal etc. However the percentage of vegetation in the ecozone is negligible now, with built up areas occupying major share of land. Some pockets like Gandhi Park serve as fount of greenery. However, the Gandhi Park and the adjoining Laxman Sahid Bhawan are in very poor condition. The Gandhi Park has neither adequate plantation nor horticulture work and is

also not aesthetically planned or maintained to attract visitors to use it. The Laxman Sahid Bhawan is in deplorable condition and the municipality has very little income from letting it for community functions.

The proposal includes:

- Improvement of boundary wall, pathways, denser plantation areas, lawns, small open air theatre etc.
- Adaptive reuse of existing Laxman Sahid Bhawan including landscaping,
- storm water harvesting pit, kiosks, improvement of gate and boundary wall etc.
- Renovation of existing public toilet
- The architecture of the toilets, gates, boundary walls and other major constructions would have Vraja character, by using similar architectural features and material such as sandstone to blend with the surroundings. The flooring of walkways would use Manadana stone and Bansipaharpur stone.

d. Improvement of Banke Bihari Temple Area

The various proposals for the improvement of Banke Bihari Temple include:

- Pedestrianization
- Covering of storm water drains
- Street lighting
- Signage
- Dustbins at appropriate locations
- Sitting benches at appropriate locations

The designs of the constructions would be such that they blend with the surroundings

2.2.3 Generating general awareness and community participation in solid waste management

a. Cleanliness drive

A one month long cleanliness drive was launched in the core area of Vrindavan on November 22, 2005 as a part of the Ecocity Project activity on "Achieving Action on Waste Management" (AAWaM) Program. The drive was intended to achieve 100% satisfaction on removal of garbage and cleaning of storm water drains and to create the needed awareness among the local residents, which might go a long way in establishing solid waste management system in at least a few of the residential colonies.

This drive also entailed the procuring of community bins and grouting them at strategic locations and safety items for workers including aprons, rubber boots, rubber gloves, face masks, caps etc.

In Vrindavan during the cleanliness drive, a one-day event named as "Jagriti" was organized on December 2, 2005 showcasing programs like Shramdaan, street plays and rally by school children. The program was a great success engendering awareness amongst people and awakening them to the importance of clean surroundings and general up-keep of the environment. The cultural events that followed epitomized the rich cultural heritage and bringing people together through the cultural songs and dances and various stage plays to create environmental awareness. During this Cleanliness Drive, the Vrindavan Nagar Palika Parishad played an important role by bringing to a common platform a number of NGOs like Food For Life and Friends of Vrindavan and helped in achieving the goals of the Cleanliness Drive. The drive contributed to:

- Unprecedented involvement of various organizations like NGOs-Food for Life, Friends of Vrindavan and Akshaya Patra and participation of large number of local people and school children
- Procurement of various basic MSWM infrastructure like dustbins, safety items like gloves, masks and rubber boots for the workers and tools like panji, favda, brooms and baskets.
- Generation of awareness amongst local people awakening them to the importance of clean surroundings and general up-keep of the environment.

b. Awareness & education programs

A number of awareness and education programs including rallies, competitions for students from schools, street plays, publishing of calendars/pamphlets and conducting of cleanliness drive were undertaken. A video film on "Vrindavan – Ecocity in the making" was brought out.

Steps taken by the CEE team to gauge the awareness levels of residents and students include:

- Competitions for school children – painting, debate etc. A painting competition was organized for school children by CEE in February 2005 in Vrindavan. A painting was selected from the competition by the Ministry of Environment and Forests, Government of India and released in the form of Indian Postal Stamp of value Rs. 5.
- Street plays (Nukkad Natak) at various locations in the core area
- Persuasion with local residents to lodge complaints against any problems regarding drains, sanitation facilities and public water supply
- Rallies through the entire core area
- Formation of resident Welfare Associations in Sindhi Colony, Banke Bihari Colony and Dusayat Colony with whom regular discussion were held apropos the general up-keep of the environment and MSWM issues in the three colonies.
- Formation of Eco-clubs in Vrindavan inviting participation from the school students in Vrindavan.
- World Environment Day event named "Sahyog" including cleanliness drive/shramdaan, environmental rally by school children and residents, competitions, Nukkad natak in major temples and cleaning of the historical Brahmakund.

A number of NGOs viz. Rotary club, Jaycee's Club, Giants Club, Friends of Vrindavan and Food for Life and schools/colleges like BSA College and Sandipani Muni School, actively participated, especially in the Cleanliness Drives and awareness campaigns during Jagriti and the World Environment Day.

2.2.4 Inferences from the case study

The various inferences that could be drawn from the case study of Vrindavan are as follows:

- ✓ The solid waste which is generally an eye sore could be cleared off during the night. This not only helps in keeping the stench and ugly show away from the visiting population but also reduces the traffic and rush that is generally there during the day.
- ✓ Emphasis should be given on possessing proper equipments for waste collection. In case of shortage of equipments or equipments not in a good condition.
- ✓ Areas with public interest such as parking lots and pedestrian paths should be punctuated with ornamental landscaping, urban structures and public utilities.
- ✓ Public toilets should be provided at strategic points such as bus stands, railway stations and other areas most frequented by tourists. The toilets' construction could be on a build – own – operate – transfer (BOOT) basis, while the maintenance could be on a pay and use basis.
- ✓ Emphasis should be given that the public utilities should be low cost and vandal proof.
- ✓ Street plays and awareness programs should be conducted by the municipality along with the non government organizations of the area in order to impart education to the masses by the municipality along with support from various non government bodies.

2. 3 Research and Development projects undertaken by Sulabh International Social Service Organization

Sulabh International Academy of Environmental Sanitation [formerly known as The Sulabh International Institute of Technical Research and Training (SIITRAT)] was founded in 1984 by Dr. Bindeshwar Pathak, Ph. D., D. Litt., with a view to providing technical support to its parental organization - Sulabh International Social Service Organization in the fields of low-cost on-site sanitation, biogas generation from human waste (public toilets) vegetable wastes, etc. It has permission under Foreign Contribution Regulation Act from the Ministry of Home Affairs, Govt. of India. The Institute is engaged in the development of new and sustainable technologies, demonstration and dissemination, training and consultancy in the fields of low-cost sanitation, low cost waste water treatment, solid waste management, environment and pollution study, etc. The Institute has a well equipped laboratory. In order to assist the industries to get samples of wastes tested to assess pollution, the laboratory is further being expanded to get recognition from Delhi Pollution Control Board.

2. 3.1 Duckweed Based Waste Water Treatment System

Duckweed - a small free floating and fast growing aquatic plant has tremendous ability to reduce BOD, COD, suspended solids, heavy metals and even toxic elements and bacterial and other pathogens from the waste water. It is a complete feed for fish and due to high content of proteins and vitamins A & C; it is a highly nutritious feed for poultry and animals. The yield of fish increases by two to three times when fed with duckweed than that with conventional feeds in ponds. Sulabh has taken up 3 demonstration-cum-study projects [refer figure no.12] in collaboration with the All India Institute of Hygiene and Public Health, Calcutta. Thee urban project located at Delhi and Halisahar in West Bengal is funded by the Central Pollution Control Board. The other two in rural areas are being funded by the Ministry of Rural Areas and Employment, Govt. of India and the royal Danish Embassy. These are being carried out in the States of Haryana and Orissa respectively.

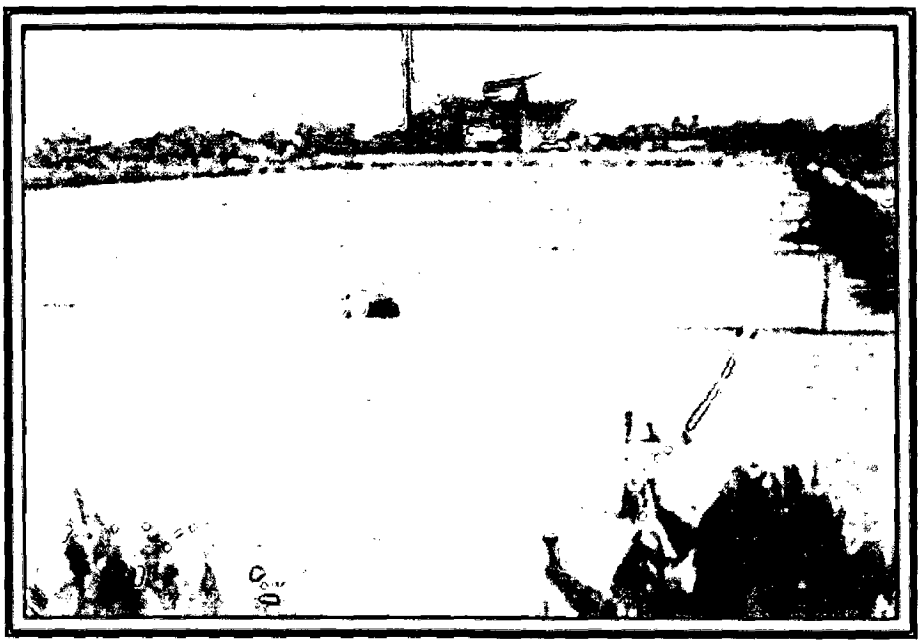


Figure 2. 12: Ponds showing intensive growth of Duckweed with bamboo frames in two directions to prevent drifting of duckweed by wind

Image source: http://www.sulabhinternational.com/

2. 3.2 Sulabh Thermophilic Aerobic Composter (STAC)

Sulabh International Institute of Technical Research and Training has developed a new technology under the guidance of Dr. P.K. Jha, Adviser Technical, which requires only 5-6 days to make compost from any biodegradable wastes without manual handling during composting.

2. 3.3 Low-Maintenance Waste-water Treatment System

Sulabh International Institute of Technical Research & Training (SIITRAT) agreed to cooperate with LOMWATS Project costing Rs. 4 million with (i) Bremen Overseas Research & Development Association (BORDA) of Germany, (ii) Groupe Energies Renouvelables et. Environment (GERES), France, (iii) Chengdu Energy Environment International Cooperation (CEEIC), China and (iv) Hangzhou Research Institute of Energy and Environment (HRIEE), China. The project is funded by the Commission of European Union, Brussels, Belgium and the State Government of Bremen, Germany via BORDA.

2. 3.4 Biogas from Human-Excreta

Sulabh biogas plant [refer figure no.13] in its present form consists of an inlet chamber, an anaerobic digester and an outlet chamber. The digester is cylindrical with arched bottom and domed top and is installed underground. The excreta from the toilet seats flow under gravity through covered drains into the inlet chamber and then into the digester. The digested slurry comes out of the digester through the outlet pipe, reaches the outlet chamber and then flows out through covered drains into soakage pits. A large round air-tight manhole is provided at the top of the digester for facilitating cleaning (desludging), and other maintenance jobs, as also, investigation of any problem during operation of digester. The gas outlet pipe and a safety pipe are attached to the manhole.

Alternative arrangement may also be made for the final disposal of the effluent, depending upon site conditions. For example, the digested effluent may be diluted with sullage and used for irrigating lawns, flower beds or orchards. Sludge drying beds are constructed if site conditions permit.

Biogas is stored under the fixed dome by hydraulic displacement of the digesting slurry inside the digester. Alternatively, the gas may also be stored in a separate drum floating over water. In the latter case, pressure of the gas is regulated which facilitates its use. Therefore, separate gas holder is desirable, especially for the large plants, in spite of the additional cost factor.

Sulabh experience shows that difficulties arise during desludging of the digester or unforeseen repair/maintenance job when the flow of excreta to the digester has to be stopped. Under the circumstances, the public toilet has either to be kept closed for the required period or alternative arrangement has to be made for diverting the flow of excreta. In sewered area, a bypass drain can be constructed. But in unsewered area, some alternative arrangement would be required. For alleviating this problem, we now recommend twin digesters in unsewered area 50% of the toilet seats are connected to one digester and the rest of the toilet seats to the other digester. During emergency shut down of one digester, the other one can take the total sewage load for a couple of day without getting upset.

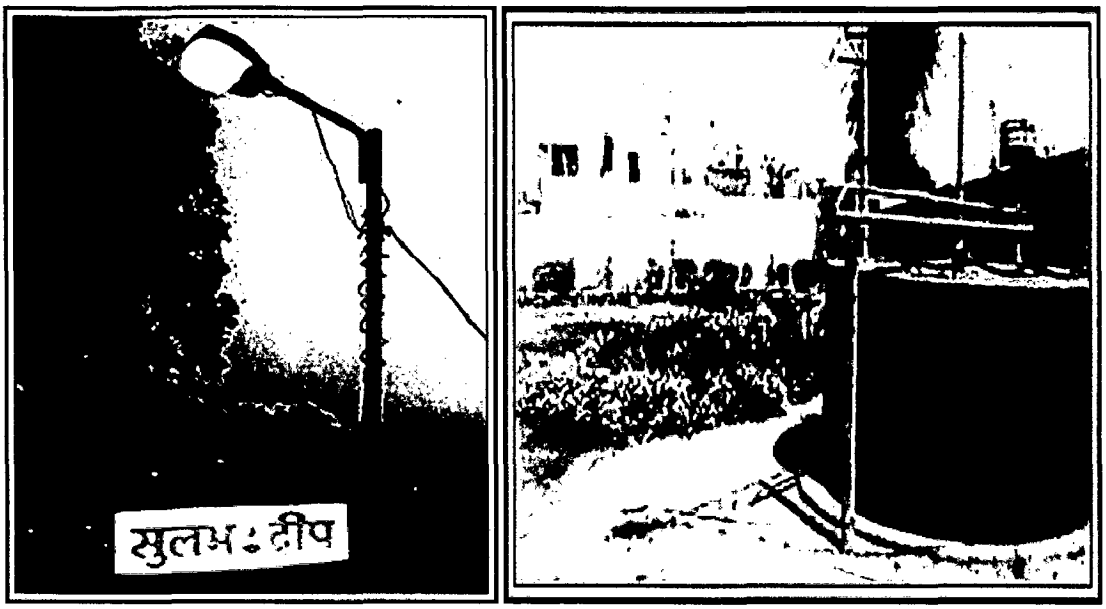


Figure 2. 13: Biogas from human excreta & aesthetically pleasing biogas plant

Image source: http://www.sulabhinternational.com/

2. 3.5 Biogas from Dried Water-Hyacinth and Other Mixed Feeds

Water hyacinth is an aquatic, seasonal and problematic weed of national concern. The Government of India formulated a Task Force to get rid of this weed. However, it has an advantage that it is a good substrate for biogas generation. Since this weed is seasonal, biogas plant based on this feed becomes non-functional during summer due to non availability of this weed. This organization has successfully demonstrated that biogas can be produced from this weed throughout the year after harvesting, drying and pulverizing. The pulverized weed can be easily transported and used for biogas generation throughout the year. The Institute has also carried out a series of experiments on biogas generation from vegetables / fruit wastes and house-hold kitchen wastes with or without mixing with human waste. Better results were obtained when human waste and vegetable waste were fed in combination. It showed an additive effect.

2. 3.6 Manure from Human Excreta

The Institute has developed a technology to granulate dried lumps into small size graded granules which look like processed tea leaves. Before granulating, it is processed in a ball mill to break into small pieces. Then it is passed through the mass mixer where moisture content of manure is regulated by adding water. Such manure

had good percentage of plant nutrients. Besides, it increases humus and water holding capacity of the soil. The Institute has carried out studies to assess its manorial effects on different vegetables and flowering plants. In all the cases tested, effect of manure on the growth was very encouraging.

2. 3.7 Use of digester effluent as hydroponics

Biogas digester has a good plant nutrient value. It can be directly used for irrigating grass lawns, flower beds or even for agricultural purposes. The institute has successfully demonstrated its use as hydroponics i.e. soil-less culture of plants. The effluent is first dried in earthen pots kept in sunlight where by evaporation concentration of effluent increases. It is filtered with thin plastic mesh. Some trace elements are added in the filtered effluent. Such liquid effluent is completely odorless. Various plants have been grown exclusively on such effluent when mixed (5 to 10% by volume) with tap water. Plants can be grown in glass bottles or any other jars and kept inside or outside room. Such technology is useful for the culture of rare plants like cactus species and other ornamental plants.

2.3.8 Inferences from the case study

Non government bodies as Sulabh International who have made forays into the field of waste water and solid waste management could be roped into the project in a large scale making them stakeholders in the project. They have experimented and at many instances executed the waste water and other solid waste in such a way that it is least harmful to the environment as well as are aesthetically pleasing.

- ✓ Waste water could be treated to form a pond that could support pisciculture.
- ✓ Human excreta could be treated to produce electricity and manures.
- ✓ Waste water treatment plants can be low – maintenance.

3

STUDY AREA

The city of Puri acquires its importance due to its religious background, a scenic sea beach and the world famous Ratha Yatra of Lord Sri Jagannath. Located in the eastern side of the Indian peninsula the city is one of the important tourist destinations of the state of Orissa. Hence it is also known as one of the nodes of the Golden Triangle – the other two being Bhubaneswar and Konark.

The city has a population of just under two lakhs but is a fast growing center. The number of tourists visiting the place has been on an increase. Hence it becomes imperative to explore about the physical and environmental conditions of the city before planning for any aspects of the city. This chapter attempts to gather as much information about the study area and analyze them.

3.1 The Study Area – Puri city

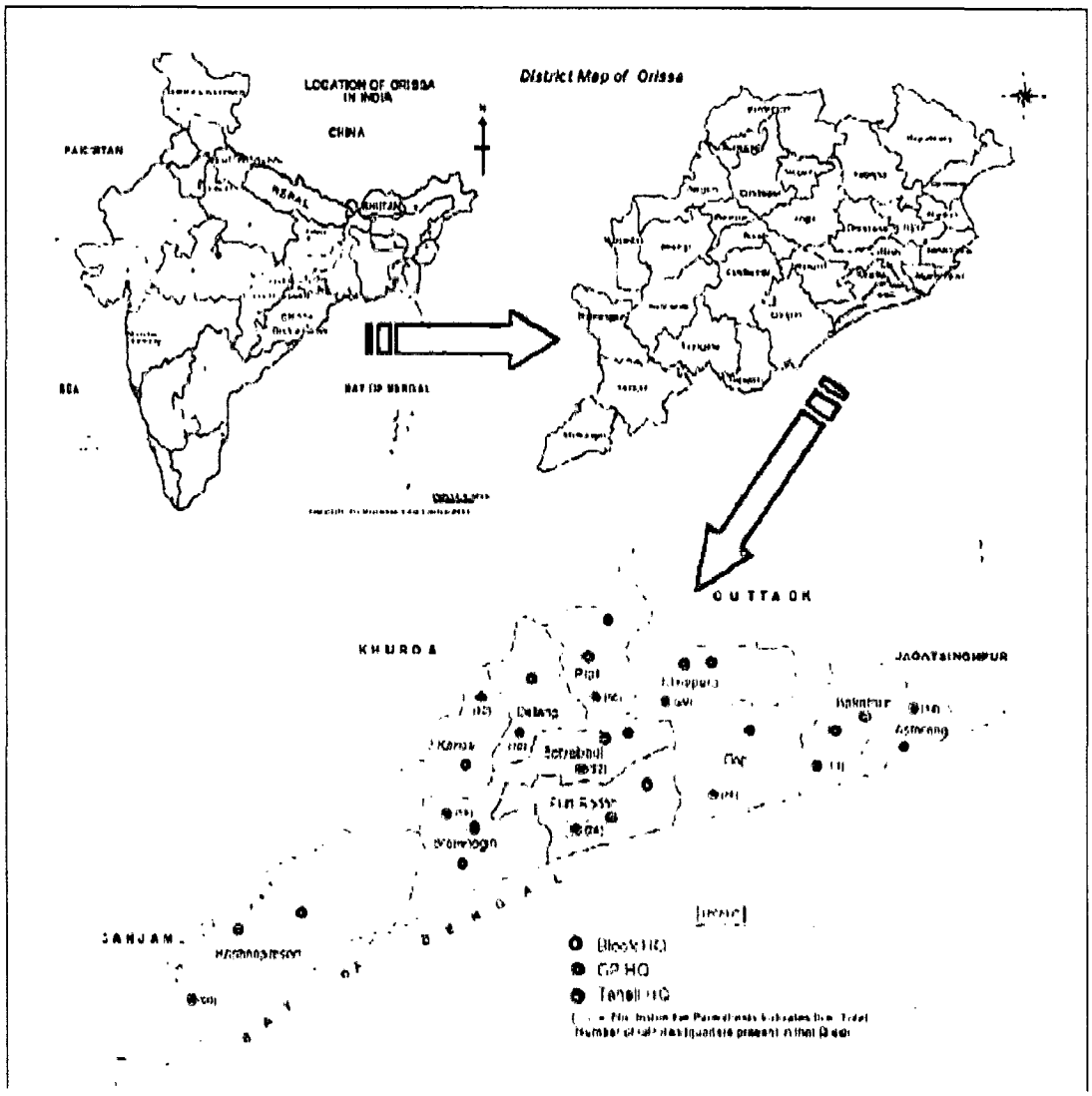


Figure 3.14 Location of Puri

Source: CDP Puri

Introduction

The city of Puri is located on the eastern coast of the Bay of Bengal in the state of Orissa (refer figure no. 1). The state is well known for its magnificent temples, sunny beaches, colorful wildlife, tribal culture and rich heritage. The state boasts of one of the most important pilgrimage centers for the Hindus in Puri, the 13th century magic carved on sandstone in Konark, the largest brackish water lake in the entire

continent in Chilika, the wonder green land for the white tigers in Nandankanan and many more caves, Chaityas and Stupas. And statistics reveal that most of the visitors frequent the state because of the Holy temple of Sri Jagannath and the Blue Bay located in the city of Puri.

Puri, the abode of the Lord Jagannath is replete with numerous historic antiquities. Numerous monuments like Sri Jagannath temple, the Gundicha temple, Sunar Gauranga, Lokanath temple and the sacred tanks like Narendra, Sweta Ganga, and Markandeya etc are the important tourist attractions. Initially the settlements began around the Jagannath temple and hence the houses within the settlements were improperly planned and interconnected with narrow lanes.

The city's geographical coordinates are - 85° 45' E & 19° 40' N and has a population of 1.5 lakhs and is spread over an area of 16.32 square kilometers, while stretching 5 kilometers along the sea coast. The city has been divided into 30 municipal wards.

The annual temperature varies from 10.6°C to 38°C while the relative humidity varies from 62% to 85%.

The location of the city is such that it is in the center of the district of Puri and is bounded by the sea on the south west and the reserve forests on the north east. The city is well connected by road to the capital of the state (Bhubaneswar) through NH – 203 as well as broad gauge railway line. While the nearest airport being at Bhubaneswar (60 kms away), it is 499 kms from Kolkata and 468 kms from Vishakhapatnam.

3.2 Importance of Historicity of Puri

The city is located on 67 kms stretch of sandy beach which extends from the Chilika Lake to the south of the Puri town. The Sun temple is located along the beach at a distance of 35 kms north of Puri.

The town consists of the Temple of Lord Jagannath in its centre with eight quarters (Sahis) radiating from it. The town colonies were called 'Sahis'. The population of the town composed mostly priests and people attached to the various activities of the temple. Besides, there are large numbers of mathas which chiefly cluster round the temple. As the rituals of the temple and Ratha Yatra became more elaborate, more people started living in Puri. Ordinary people who have no contribution to rituals have also started living. The town was originally built on sandy track which began from north and west towards Cuttack and Ganjam road where the Madhupur or Matia stream is lined with the largest tanks, Narendra, Mitiani, Markandeya and Siva Ganga. As the

tributary of the river Matiani draining into the sea dried up, it paved the way for the new direction of development of the town in the southeast.

The antiquity of the initial settlement of Puri is shrouded in mystery. But a number of Sanskrit Slokas indicate an early settlement around Puri dating back to the date of Rig veda itself. According to historical records, the early settlement of Puri started with fisherman (Dhibars along the sea and hunter-gatherers (Sabars) in the forests, later settling in scattered agricultural villages. The town owes its birth and existence to the temple of Lord Jagannath. The story of the origin of the temple of Jagannath at Puri dates back to the times of Mahabharata. According to it, Lord Krishna was killed by the arrow of Jara, a fowler, Arjun consigned the body to flames, but the flames could not consume it. Directed from the heaven, Arjun then threw the body into the sea at Dwarka. It floated in the form of a Daru log and took thousands of years to reach the eastern shores. Indradyumna, the King of Malava who had performed a thousand Ashwamedha Yagna, found this log and for whom the god appeared in the form of log at Puri; with this he got constructed the three deities of this temple. In 262 AD King Ashoka invaded Kalinga, but the devastation did not cast a permanent shadow on the settlement as Ashoka changed to Ahimsa, and to Buddhism. During his period, of rule, Buddhism spread in Orissa but not so much in Puri. In 640 AD Chinese traveler Huen Tsang probably visited Puri. In 9th century A.D., a major change came in Puri. Acharya Shankar visited Puri, and upgraded the place as one of the four 'Dhamas'. 10th century king Yayati Kesari (Yayati-II of Somavamsi dynasty) is likely to have built the second temple on the same spot, as the first temple by Indradyumna was dilapidated. The king Anantavarman Chodaganga Deva (1174 – 1198 A.D) of the Ganga dynasty built the third or the present temple. He began construction of the temple sometime after 1135 A.D. The temple was completed by his descendant son Anangabhima Deva III. In this time most of the migration took place to Puri due to its welcoming geological nature and the most holistic Jagannath temple. Pilgrims started visiting this place and it became an important pilgrim center.

3.3 Importance of the temple of Jagannath

The whole region around Puri is influenced by the temple in various aspects as if the temple is the most important employer of the town. It is the main market for agricultural products of the whole region. For the preparation of mahaprasada the temple requires an immense quantity of agricultural products like rice, ghee, vegetables

etc. Several settlements produce goods mainly for the temple and its pilgrims (pots, paintings etc).

As per the information shared by the Temple management committee approximately 1200 families of sevayats (Servitors) are engaged in temple rituals round the year. Nearly five hundred cooks work in the kitchen of the temple. These cooks further employ nearly five hundred more workers.

All these figures mentioned are only to give a picture of the extent of Temple's influence on the economy of the Puri town.

3.4 The Temple Economy

The economy of the temple appears to be very complex. The religious importance, which attracts hundreds of thousands of pilgrims throughout the year, could be the reason for immense and complex institution and the necessary organization. The total numbers of people directly within the secular organization count approximately two hundred. These are basically the temple officers from the administrative and control staff. The ritual organization which nearly consists of two thousand people, receives an equal share of *Bhoga* as remuneration of their services. The economic activities of the temple can be categorized as under:

- Receipts: The temple generates revenue from the donation by the devotees, ticket darshan, land revenues, rentals from the properties, sale of books and photos etc.

- Expenditure: The expenditure are mainly for performance of daily rituals of the temple, maintenance of security for pilgrims, amenities for pilgrims, maintenance of temple and observing festivals round the year including the Ratha Yatra. [6]

3.5 Tourist attractions around Puri

Puri is located on one of the nodes of the golden triangle of the Orissa state which also comprises of the Sun Temple at Konark and the Lingaraj temple at Bhubaneswar.

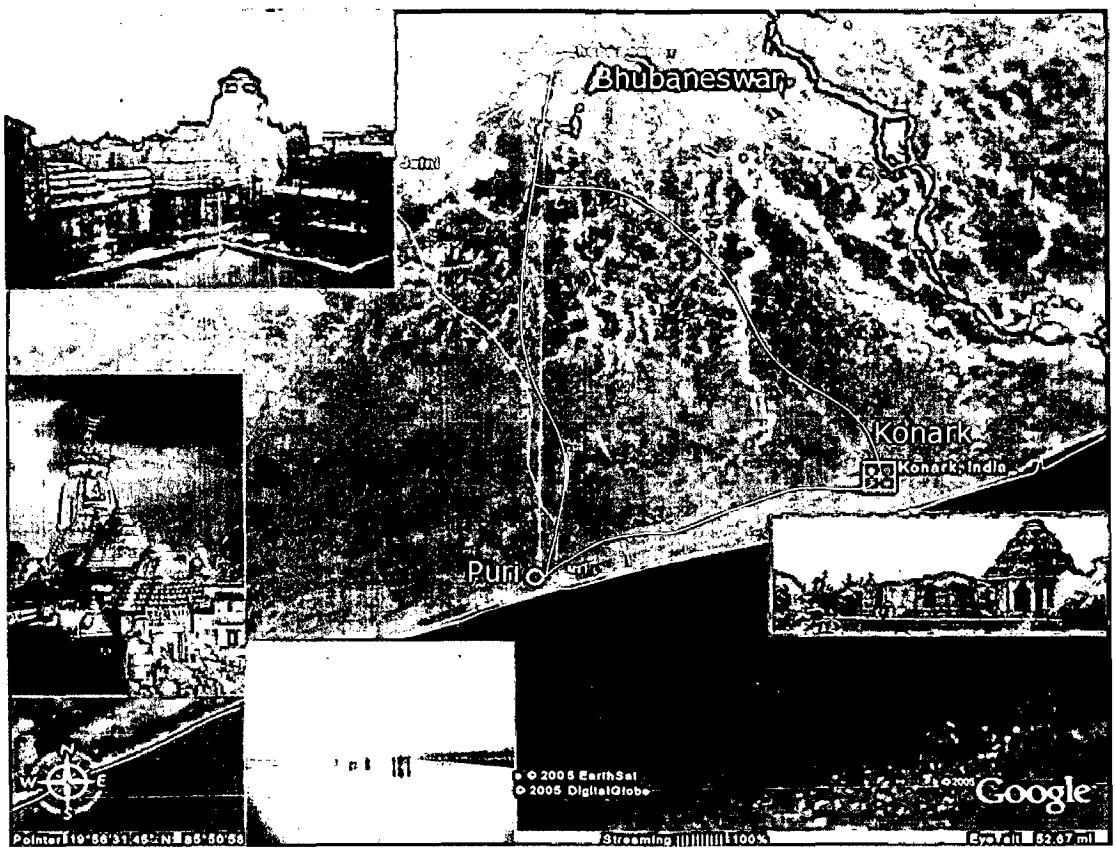


Figure 15: the Golden Triangle Source: Redrawn by author based on google map

Puri Town is one of the nodes of the golden triangle of Orissa with Bhubaneswar and Konark being the other nodes (refer figure no. 2). The town has been bestowed with magnificent sea beach. Lord Jagannath temple epitomizes the citadel of Jagannath culture. Many a natural tourism destination with potential are located surrounding Puri. The list of such destinations with approximate distance from Puri has been given in Table no. 2.1.

Table: 3.1 Table listing the tourist attractions around Puri and their distances from the city

Sl.no	Place	Distance in km from Puri
1.	Bhubaneswar	60
2.	Konark	35
3.	Satapada	50
4.	Bishwanath Hill	35

5.	Kakatpur	60
6.	Astarang	70
7.	Kuruma	43
8.	Satyabadi	19
9.	Baliharachandi	27
10.	Balighai	14
11.	Chaurasi	70
12.	Raghurajpur	14
13.	Brahmagiri	25
14.	Pipli	40
15.	Ramchandi	27
16.	Beleswar	17
17.	Jahaniapira	72
18.	Baligaon	29

Source: Directorate of Tourism, Puri

3.6 Places of Tourist Interest in the city:

The city is famous for the following landmarks namely the Lord Jagannath Temple, the Gundicha Temple, the Golden Beach, the holy cremation ground (Swargadwar) and the five holy tanks (refer figure no. 3). Besides these places there are a host of other temples and monasteries that are scattered all over the city which are visited by the tourists and pilgrims. Amongst the above mentioned places of tourist interest there are certain categories of places that are either out of bounds for certain categories of visitors or hold less importance in the itinerary of the visitors because of their locations e.g. most of the temples including the Lord Jagannath temple do not allow foreign tourists and non – Hindus to enter inside the premises while the holy tanks being scattered all over the city and having less of aesthetic appeal are not visited by people for non religious purposes. The Swargadwar (holy cremation ground) lies on one end of the Golden Beach. Hence the visitors (mostly Hindus) happen to pay a visit to it even for non – religious purpose.

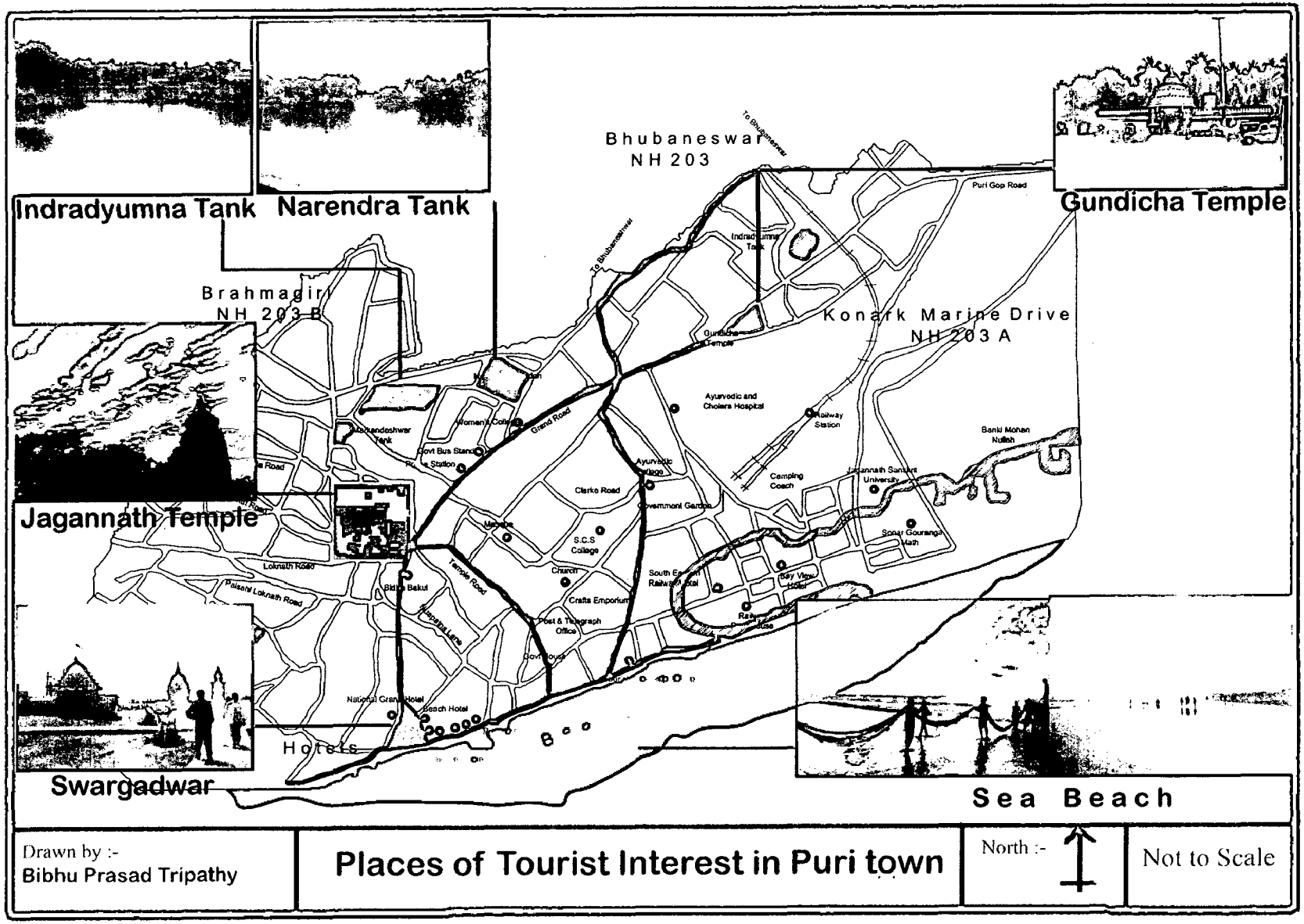


Figure 3.3: Places of Tourist interest in Puri

Source: Prepared by the Author

3.7 Delineation of Areas:

Table: 3.2 Table listing the tourist attractions in Puri City & type of tourist frequenting the place

Sl. No	Name of the Tourist Attraction	Type of Tourists			
		Local	Regional	National	Foreign
1.	Lord Jagannath Temple	☆	☆	☆	
2.	Gundicha Temple	☆	☆		
3.	The Golden Beach	☆	☆	☆	☆
4.	Swargadwar	☆	☆		
5.	5 holy tanks	☆			

☆ Areas visitors frequent

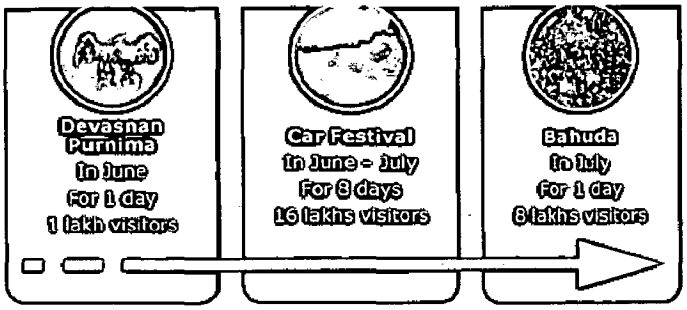
Source: Primary survey by Author

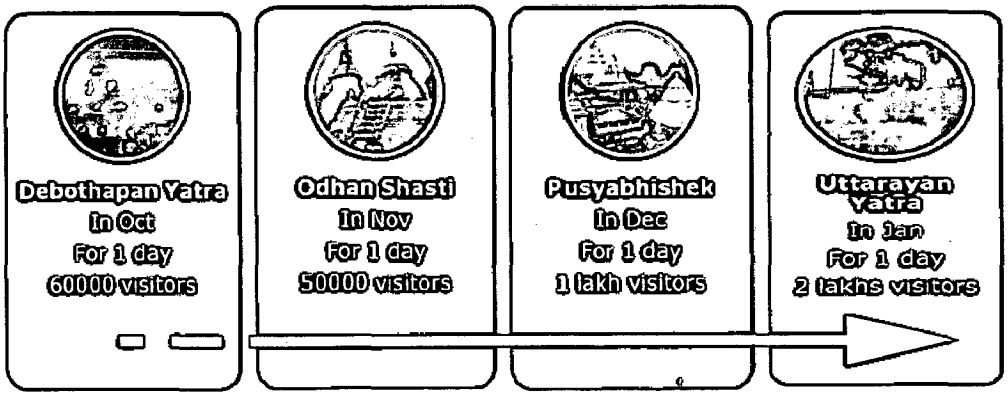
As is evident from the above chart (refer Table no. 2.2) the areas that are most frequented by the tourists and pilgrims are the Golden Beach, the Lord Jagannath temple, the Gundicha temple and Swargadwar (the holy cremation ground). Hence these areas were identified as the specific study areas.

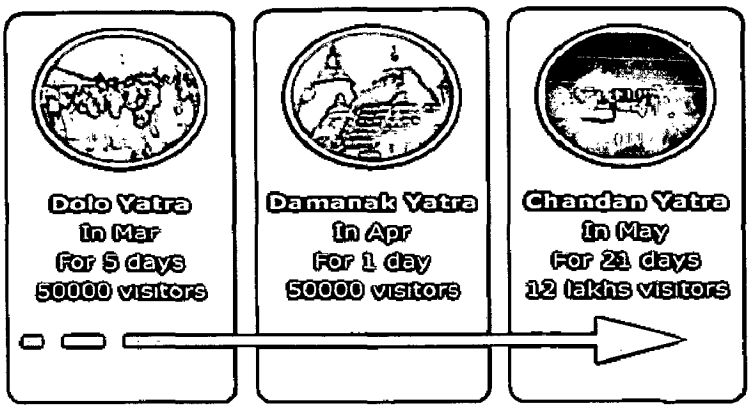
3.8 Pattern of tourist inflow

Puri celebrates 13 important festivals in 12 months each year (refer Table no. 2.3). Each of these festivals attracts thousands of visitors. These activities are directly and indirectly linked with the cities employment and economic development potential. It is estimated that around 80% of cities income is linked with heritage related activities. The calendar of events starts with Devasnana Purnima in June which attracts over a lakh number of tourists. This is followed by the car festival of Lord Jagannath. The calendar of events given below gives a picture about the festivals celebrated within and around the temple, period and the number of tourists visiting the place during that period.

Table: 3.3 Table listing the important festivals in Puri city round the year & no. of tourists attending them

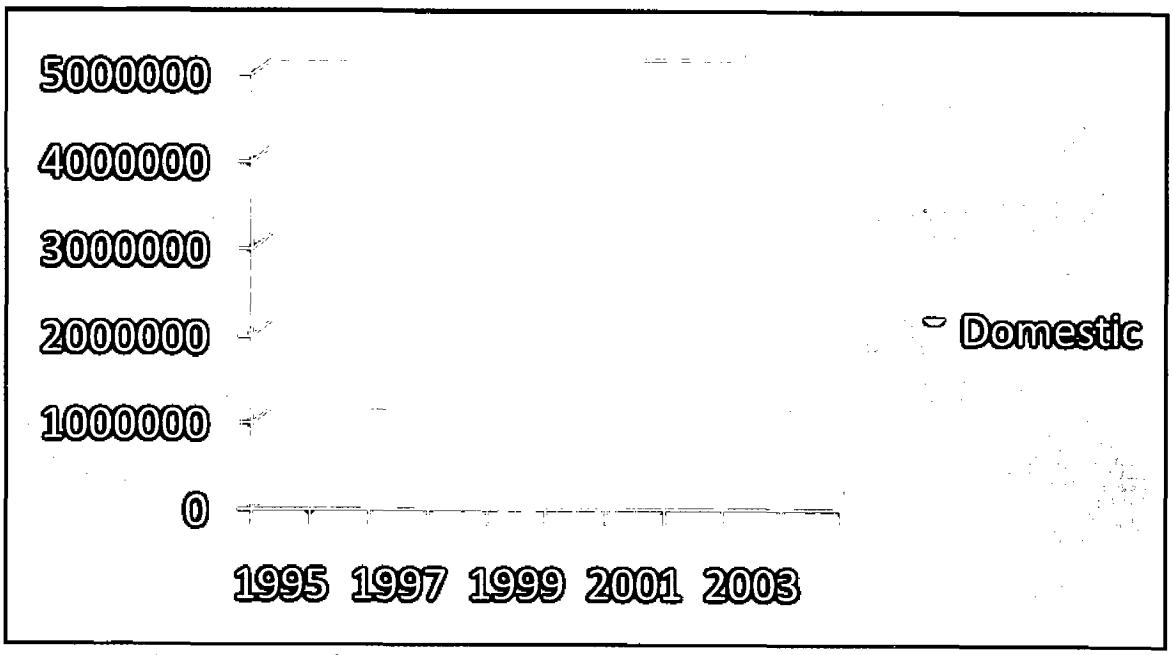




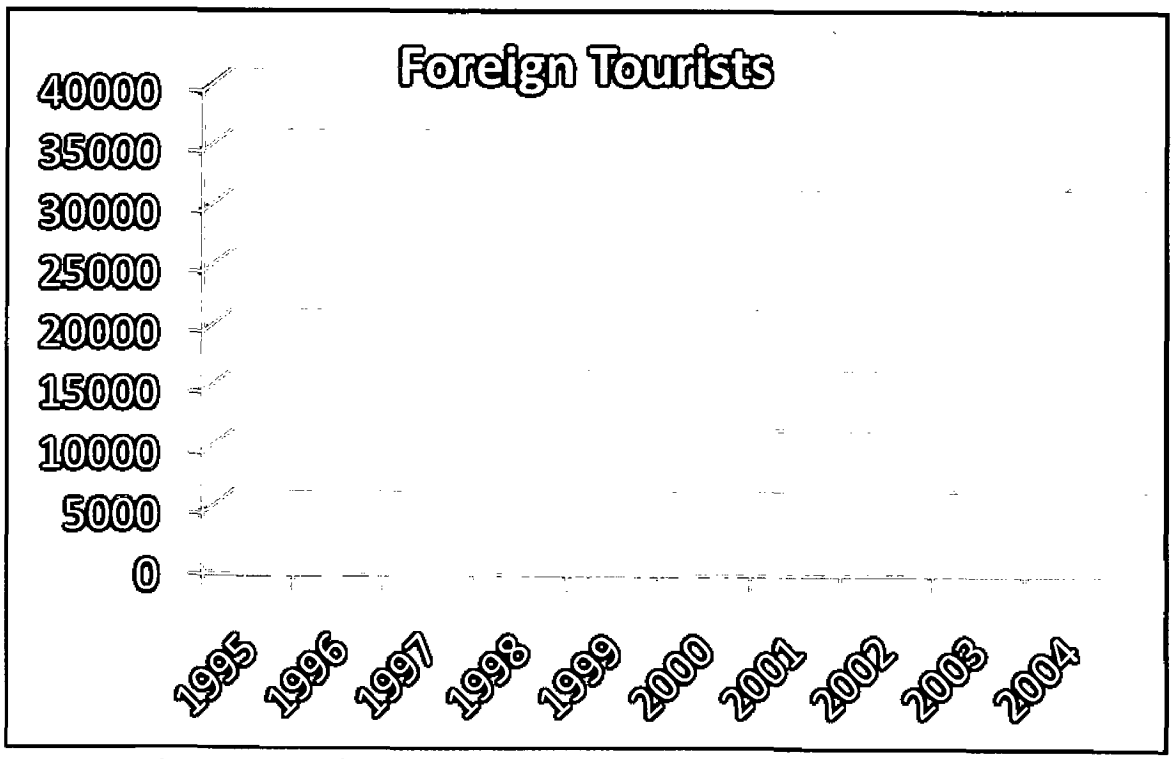


Source: Puri Municipality & Temple Authority

Statistics reveal that there has been a significant increase in the number of domestic tourists visiting the city while the number of foreign tourists has only increased marginally. The graphs below show the pattern of tourist inflow over the past few years.



Source: Directorate of Tourism, Puri



Source: Directorate of Tourism, Puri

3.9 Puri Today

Puri today is the forerunner of the Jagannath culture in Orissa, which saw the flowering of several temples dedicated to Jagannath all over the world. It attracts millions of devotees through out the year on different occasion.

Puri represents one of the four peethas established by Adi Sankaracharya, the other three being Sringeri in south India, Dwarka in Saurashtra, and Badrinath in the Himalayas. Chaitanya in 15th - 16th century popularized the worship of lord Jagannath. The temple dominates the town in every sphere - physical, social, cultural and economic. The town of Puri has evolved around it so that an intricate web of relationship exists between the temple and the town dwellers. There are many ancient settlements around the temple precinct that are engaged in the temple activities and are responsible for providing different materials for management of temple. Elaborate worship services are carried out throughout the day here. Puri as a town is more than thousand years old and being a religious town, the town is based on Vaastu Purusha Mandala and many meta-physical aspects have been interwoven in planning of the town. There are as many as 24 festivals each year, the most important being the Rath Yatra or the Car festival in the month June - July. Puri, known all around the world for its 'Rath Yatra' the cumulating point of all the festivals, is celebrated in all pomp and grandeur along the Grand Road (refer figure no. 4).

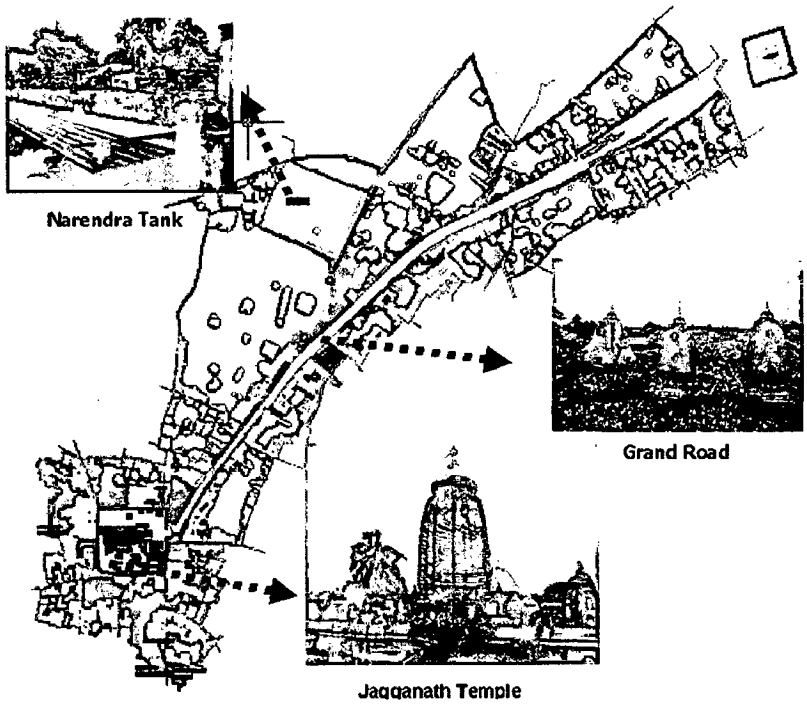


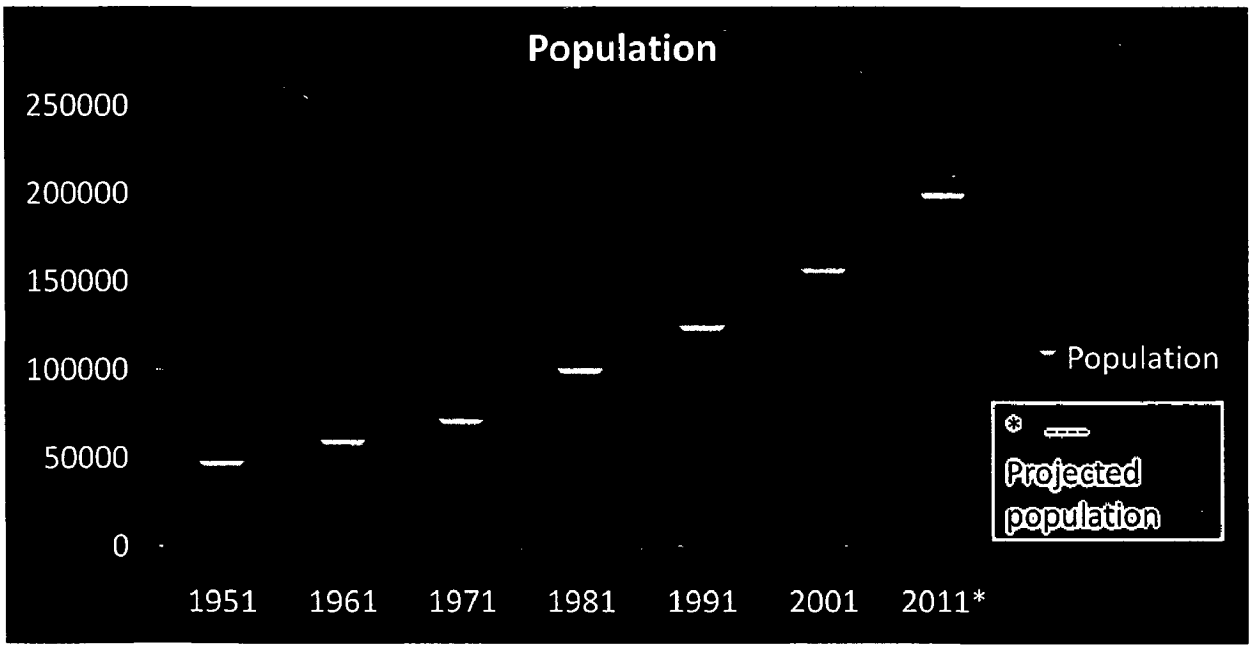
Figure 16: The Grand Road, Puri

Source: CDP Puri

The grand festival of Ratha Yatra which attracts more than a million people from all over the world is arranged with combined effort of Orissa Government and Temple Management committee. Today tourism provides livelihood for almost 80% people of the town. The total economy of town is depended on the inflow of tourist population. Ratha Yatra being the most important festival is also the one, which has a strong environmental, social, cultural, economic and spatial impact on the town. The preparation for Ratha Yatra starts months before the actual festival.

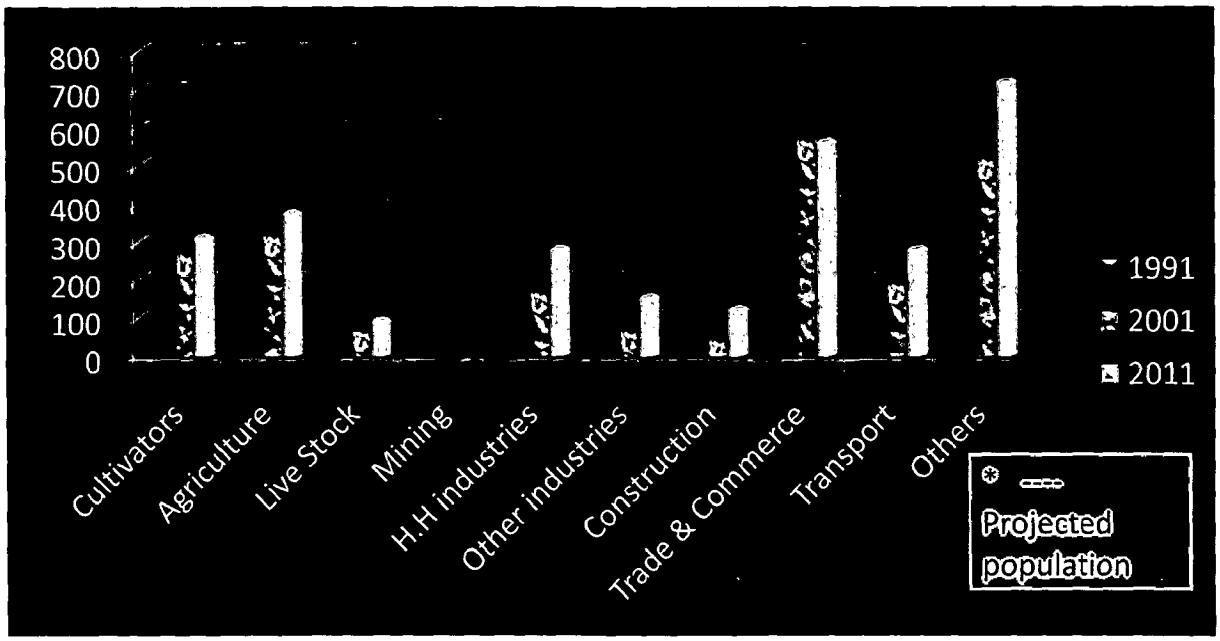
3.10 Area and Demographic Profile

The administrative jurisdiction of the Puri Municipal area spreads over 16.3268 square kilometers and stretches along a sea shore of about 5 kilometers. The entire city of Puri has been divided into 30 municipal wards (refer figure no. 5). As per the 2001 census report the population of Puri town was 157 610 with a growth rate of 26% during the period 1991 – 2001. The growth rate of the town is less than the state average (urban) which is 30.28% for the period 1991 – 2001. The graph below shows the decade wise population growth.



Source: Census 2001

Demography (Occupational Structure)



Source: Census 2001

3.11 Organizations in Governance

The city has various urban local bodies that work in tandem for its maintenance and smooth functioning. They are the Public Health and Engineering Organization, the Puri Konark Development Authority, the Orissa Pollution Control Board, the Temple Administration, the Orissa Water Services and Sewerage Board and the Puri Municipality.

3.12 Land Use – A General Picture

The city has two distinct portions: the western part & the eastern sandy tract (Balukhanda). The inhabited part of the Balukhanda presents a planned view of the city which consists mainly of offices and institutions. The western part, on the contrary, bears an unplanned and unhealthy view. The town proper consists of the Temple of Jagaannath with the different quarters (Sahi) radiating from it and the main road, Badadanda, extending from the Temple to Gundicha Badi. The present physical extent of the town proper may be attributed to unplanned and unrestricted sprawl of the various 'sahis' around the temple. There appears to be no proper inter relationship between the various uses [refer figure no.6]. Commercial, residential and public uses have emerged simultaneously in a mixed form and there exists no distinct identity

of any use. Again the blowing sands have also been a contributory factor towards haphazard growth. Owing, perhaps to this natural feature, most of the houses especially in the old town have been constructed on raised platforms in order to avoid in blowing sand from entering in to the house. That is why wherever higher lands were available development started on such lands. As in case of many old towns, developments are mostly restricted along roads and lanes, the rear portions have remained vacant in the shape of undeveloped lands. Rows of buildings have come up along the roads without any uniformity. Thus the town proper with its nucleus in the form of Jagannath temple is densely developed and presents an unhealthy look characterized by overcrowding, congestion, slum influences, lack of sanitation, dilapidation, narrow and crooked lanes and lack of service and community facilities. Another striking feature of growth pattern has been that there has been a tremendous decline in the area under the green cover and open land. While the land under residential land use has remained more or less the same the land under the commercial land use has seen a rise [refer figure no. 7].

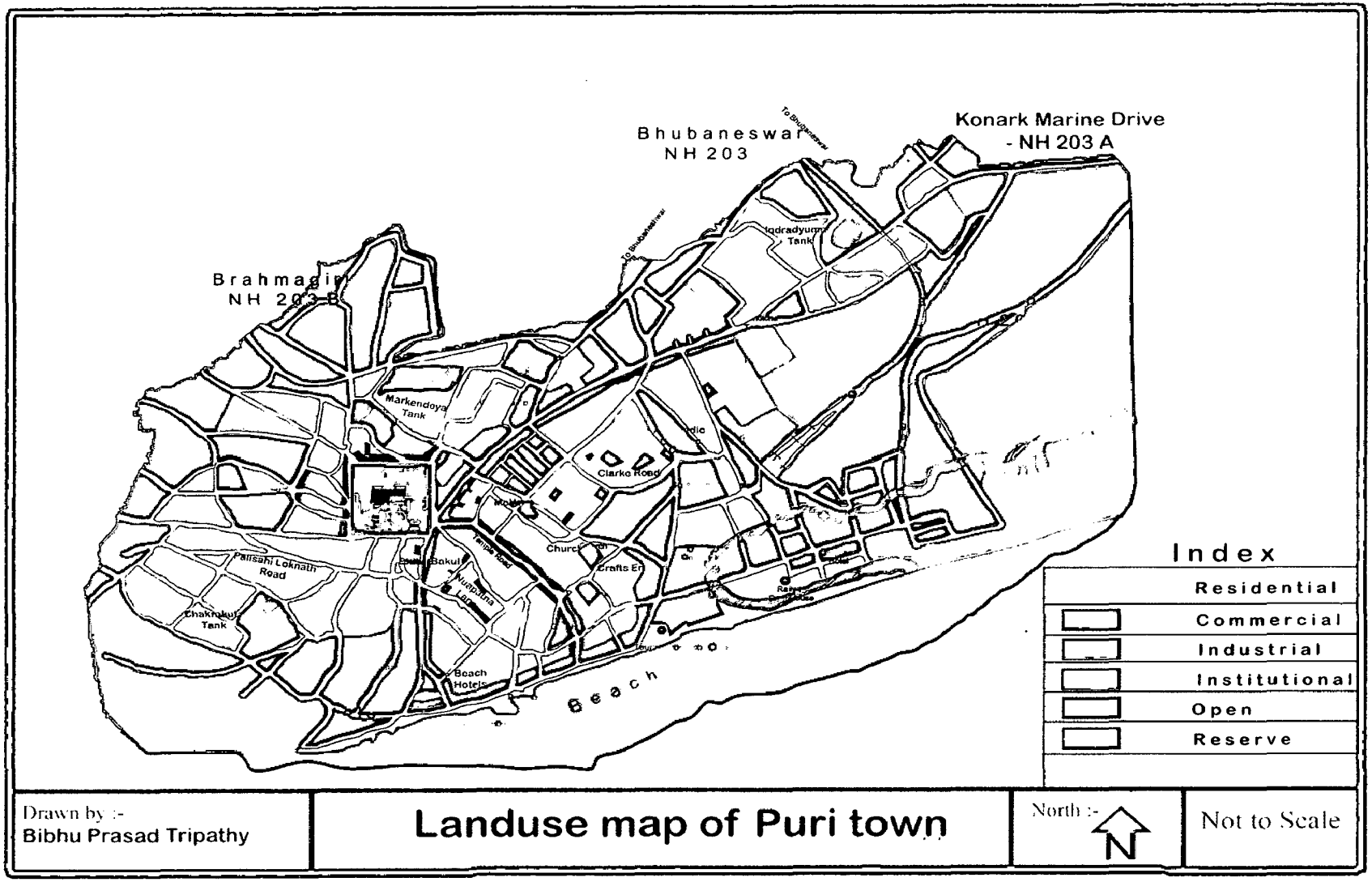


Figure 18: Land use map of Puri (Existing) **Source: Redrawn by Author**

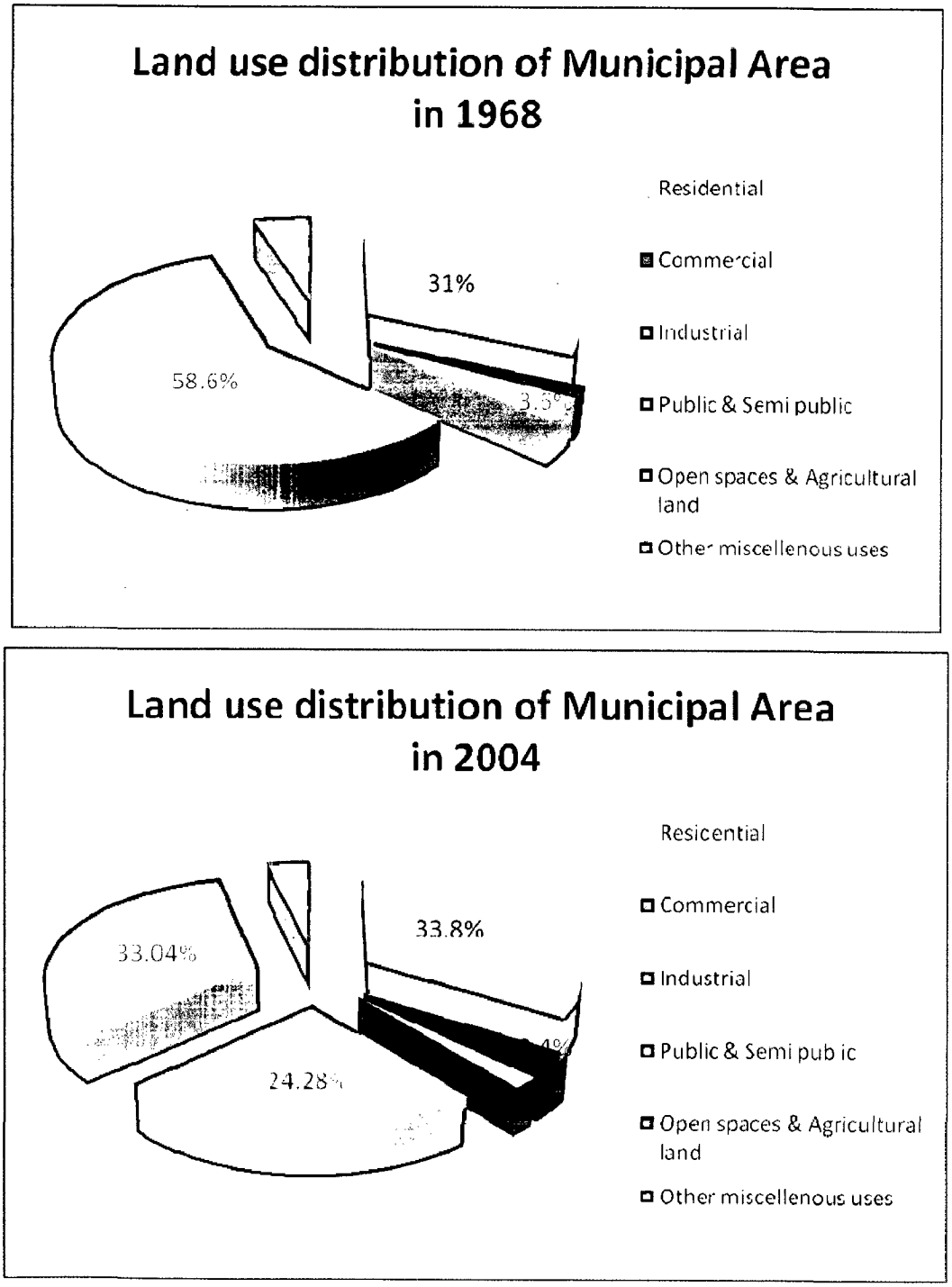


Figure 19: Land use distribution **Source: CDP, Puri**

3.13 Trends of Development (1968 – 2004)

The city of Puri has grown in two directions [refer figure 8] i.e. towards Bhubaneswar and Brahmagiri. The town has expanded in the North -East to South-West direction, into the green buffer planned in 1968. There has been an increase in the residential area within the municipal boundary from the core towards the periphery and new residential developments and planned residential localities are coming up in the peripheral regions of the city. There has been a considerable increase in the commercial activities along the Bada Danda stretch and roads along the sea beach. This can be attributed to the high population of tourists. There are a number of hotels and guesthouses that have come up along the sea beach road. There is also a gradual conversion of residential use to commercial use which is predominant throughout the city especially in the areas of tourist interest. The character of these areas is that of mixed land-uses. There is also growth of informal sector spread all over the city especially along the beach near Swargadwar area . A considerable decrease in agricultural land and open spaces has been observed. Many of the open spaces and vacant lands are getting built upon, the pressure on the land is increasing, driving up the land values. The numerous gardens belonging to the Sahis and mathas have also reduced with the construction of newer buildings within the compound itself.

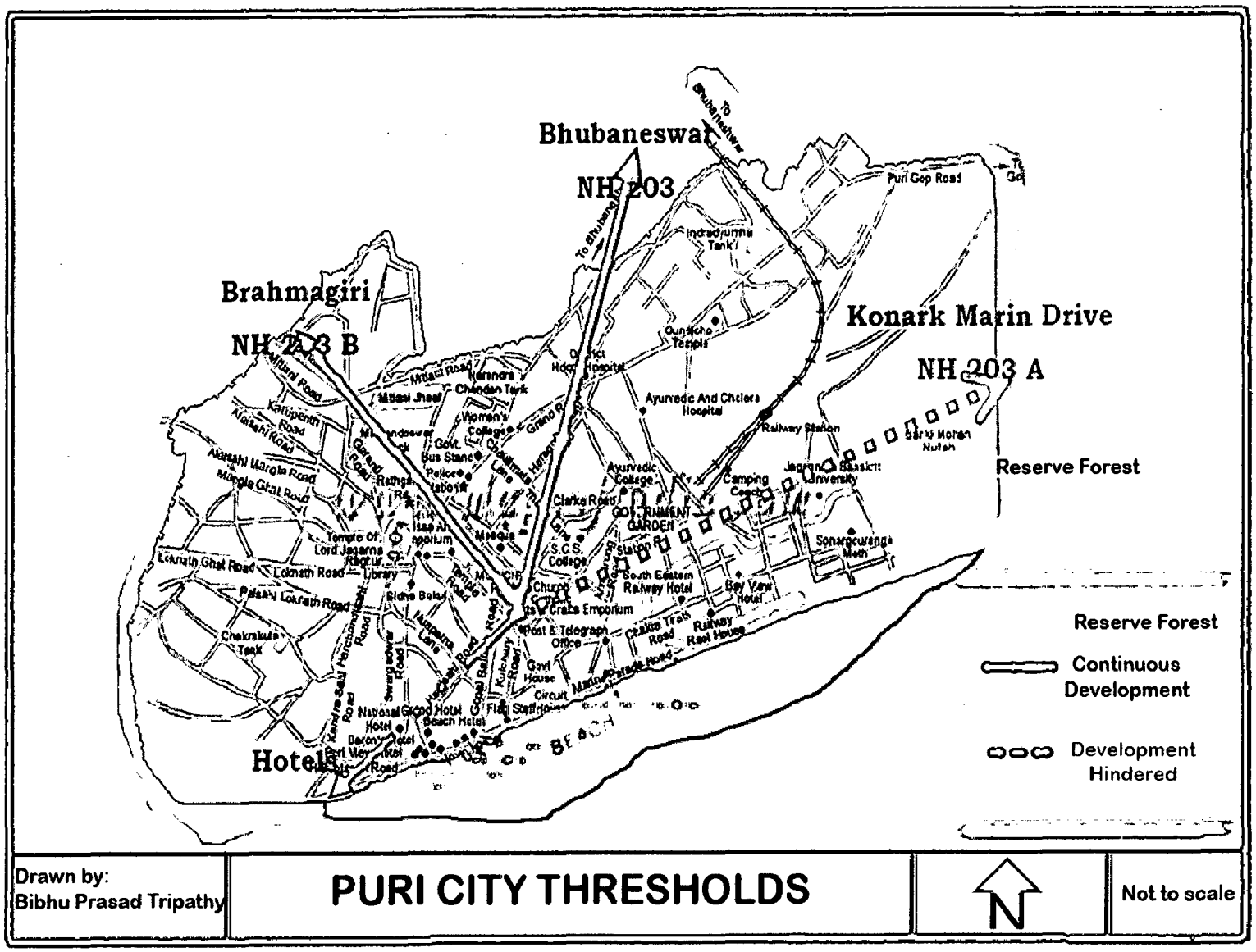


Figure 20: Puri City Thresholds

Source: Redrawn by Author

3.14 Emerging Issues

There have been several emerging issues due to the developmental trends. Due to rapid transformation of residential areas to commercial activity, mixing of land uses is taking place indiscriminately and as a result the intensity of use is increasing along with this friction of spaces are taking place. This Incompatibility of land uses have resulted in transformation of physical fabric and increased congestion of the city's various networks. The role of religious core has shifted from a social and cultural centre to that of a commercial core of the city. The effects are clash between religious and commercial activity. High density in the core areas has lead to deterioration of physical environment and living conditions. Haphazard development has led to the deterioration of the city fabric along with filling up of low lying areas and wetlands. The tourism sector forms a major component of the city's economy but if the sector is not developed in a planned fashion then sustainability will be a problem. In the overall development of the city one does find the lack of planned recreational and open spaces. Stricter enforcement of the CRZ Regulations seems to be one of the major issues that need to be addressed immediately. In the wake of all this government of Orissa may undertake a detail study on the growth potential of Puri city.

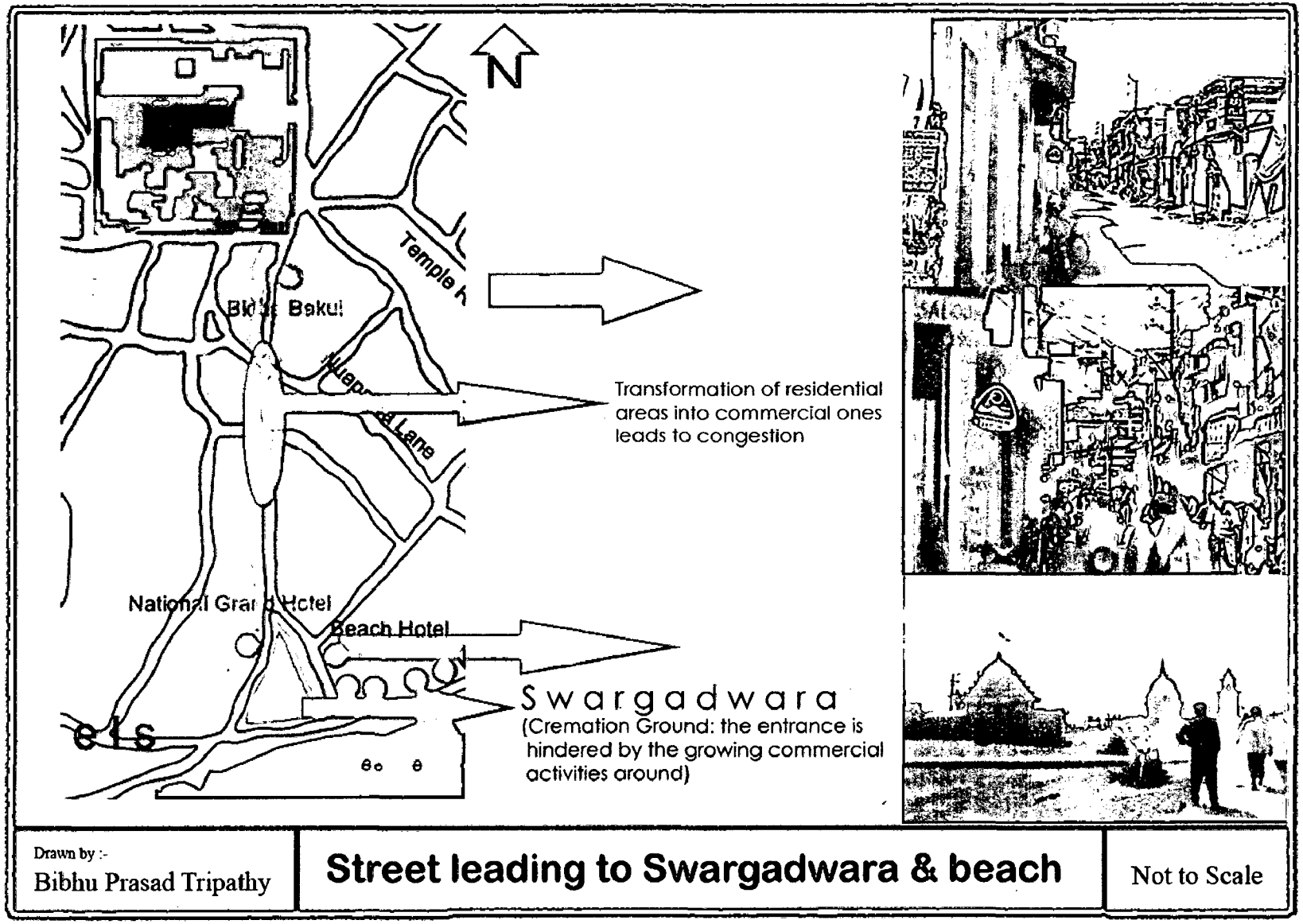


Figure 21: Map Showing Street to Swargadwar & Beach **Source: Prepared by Author**

3.15 Roads & Transport:

At present the N.H. Roads are maintained by N.H. department Govt. Of Orissa. The O & M cost of the N.H. Roads and financial aspect is taken by Government of India. P.W.D. Roads are being maintained by Work Department, Government of Orissa. The O & M cost and financial aspect are being taken care by Work Department, Government of Orissa. The Municipality roads are maintained by Puri Municipality from its own source and also from grants of the Government of Orissa. There is proper co-ordination between Puri Municipality, Public works Department and National Highway for smooth and efficient management of the traffic. During festive seasons, co-ordination Committees is being set up for providing one way traffic routes, parking places and other requirements. Regarding transport management, special permit to the buses are given, extension of route buses from outside to Puri, relief vans from the approach of main roads to Puri good number of Traffic Inspectors are being engaged. Speed control of the buses, provision of First Aid in the buses, provision of crane and tractors are engaged for clearance of accidents occurred if any, restriction and use of air horn, provision of Ambulance at Railway stations and Bus stands are taken care by Transport Management.

Almost 75-80% of the vehicles running on the roads are mainly slow moving and very few are fast moving vehicles which are two-wheelers. There had been no consideration in planning system in the road infrastructure. The total volume of traffic on the Grand Road is approximately 16,000 on a normal day. The vehicular composition of the vehicles in the morning and evening has maximum percentage of slow moving vehicle, that varies from 65% to 75% and the fast moving vehicle varies from 25%.

The journey speed of the vehicle in the Grand Road is approximately 50 Km/hr. Hence, it can be inferred that the problems in the Grand road is mainly due to the congestion of larger number of vehicles, lesser parking facilities and too many intersection which serve as through traffic for slower vehicles.

Table: 3.4 Table listing various types of roads in Puri

Types of Road	Length
National Highway	8 kms
P.W.D road	20 kms
Municipality road	
Blacktopped	153.589 kms
Metalled	83.262 kms
Un metalled	38.972 kms
Cement concrete	36.116 kms
Earthen road	58.28 kms
Total	**691.901 kms**

Puri City has an extensive road network of approximately 691.901 kms within the Municipal limit. There is a wide variation in the width of such roads starting from 8'-0" width to 300'-0" width. The municipal roads works within the Municipal limits are being maintained by Puri Municipality and PWD and NH roads are being maintained by respective departments. Puri does not have air connectivity. The surface transport (roads) connectivity between Bhubaneswar and Puri is quantitatively enough but requires four laning to attract good quality luxury buses for tourism development.

Puri being famous for its religious temples and beach has attracted large number of tourist from every corner of India and states. Grand road connects the Jagannath temple with the Gundicha Temple. This brings in a large number of populations in the Grand Road during day time.

3.16 Characteristics of Grand Road:

The Grand road forms too many intersections. At every 80-100 meters the road is being served by the collector road. Too many junctions in the road give opportunity to the entries into the Grand Road. This also results in the congestion along the road side. However, the traffic is being controlled by the police at major intersection.

There is a large flow of slow moving vehicles that reduces the speed in a meantime. No parking facilities provided along the Grand road which is another reason for the road to be congested. The width of the road varies at different sections with the average width being 45 – 50 meters, which goes up to 100 meters near the Gundicha temple and is 45 meters near the Jagannath temple [refer figure no.10].

3.17 Characteristics of other roads of Puri:

It can be noticed that there is an absence of hierarchy of roads within the entire city. Cycle tracks and footpaths along roads barely exist. There is also an absence of parking for vehicles, even in places of visit. Public facilities, telephone booths, passenger shelter etc are also not available. There is a higher composition of slow moving vehicle in the grand road creating congestion. Too many intersections give an opportunity for the vehicles to enter into the required destination. Too many entry points around Jagannath temple, therefore brings in more and more vehicles to this particular place. There is no controlled intersection except on in Grand Road. No provision of street furniture is available especially in the areas with tourist interest. The area with highly commercialized land use has narrow roads despite being an attracting zone. The town being a religious place has too many pedestrian traffic, therefore proper pedestrian system is needed which is absent in this town.

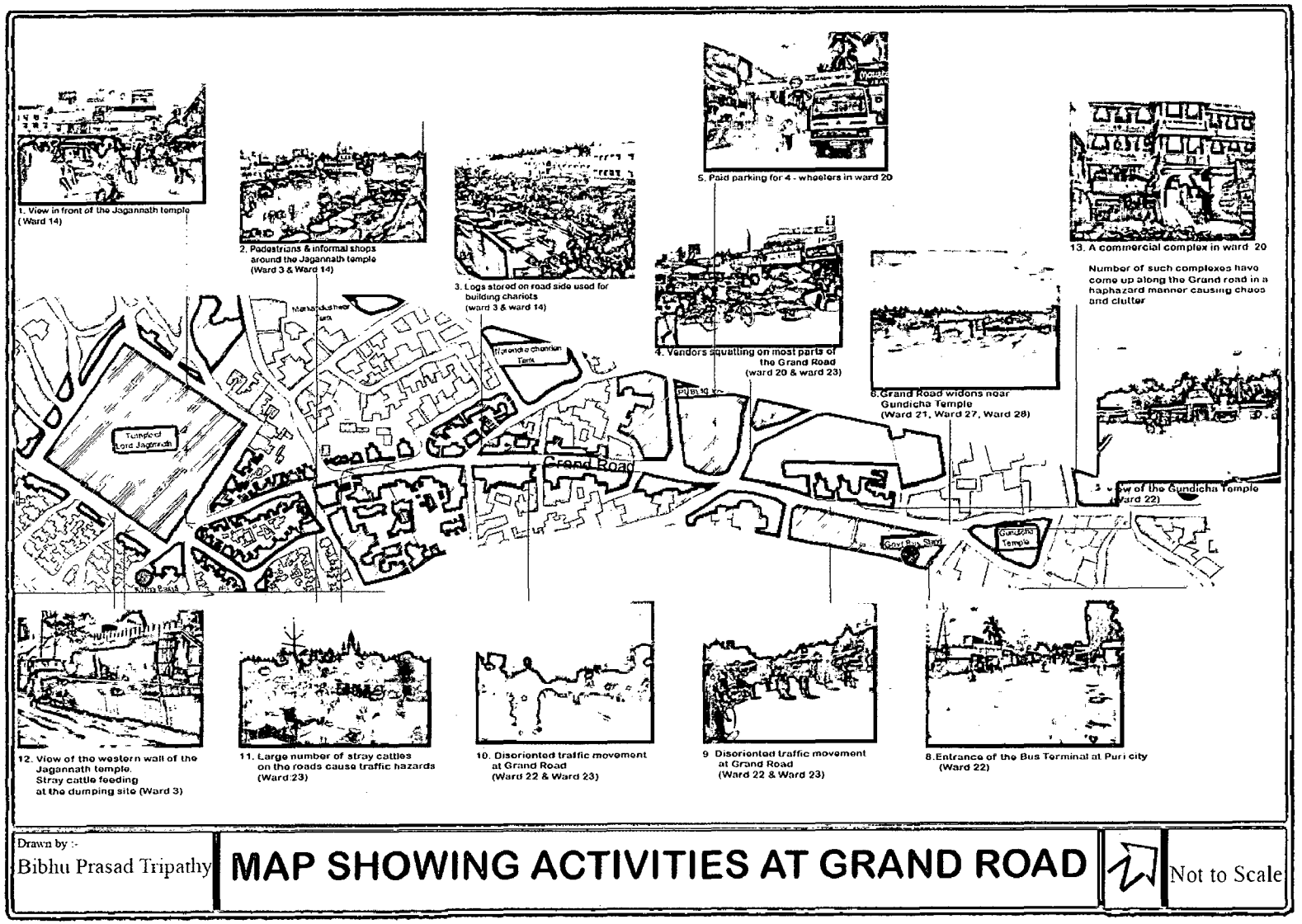


Figure 22: Map showing activities around the Grand road **Source: Prepared by Author**

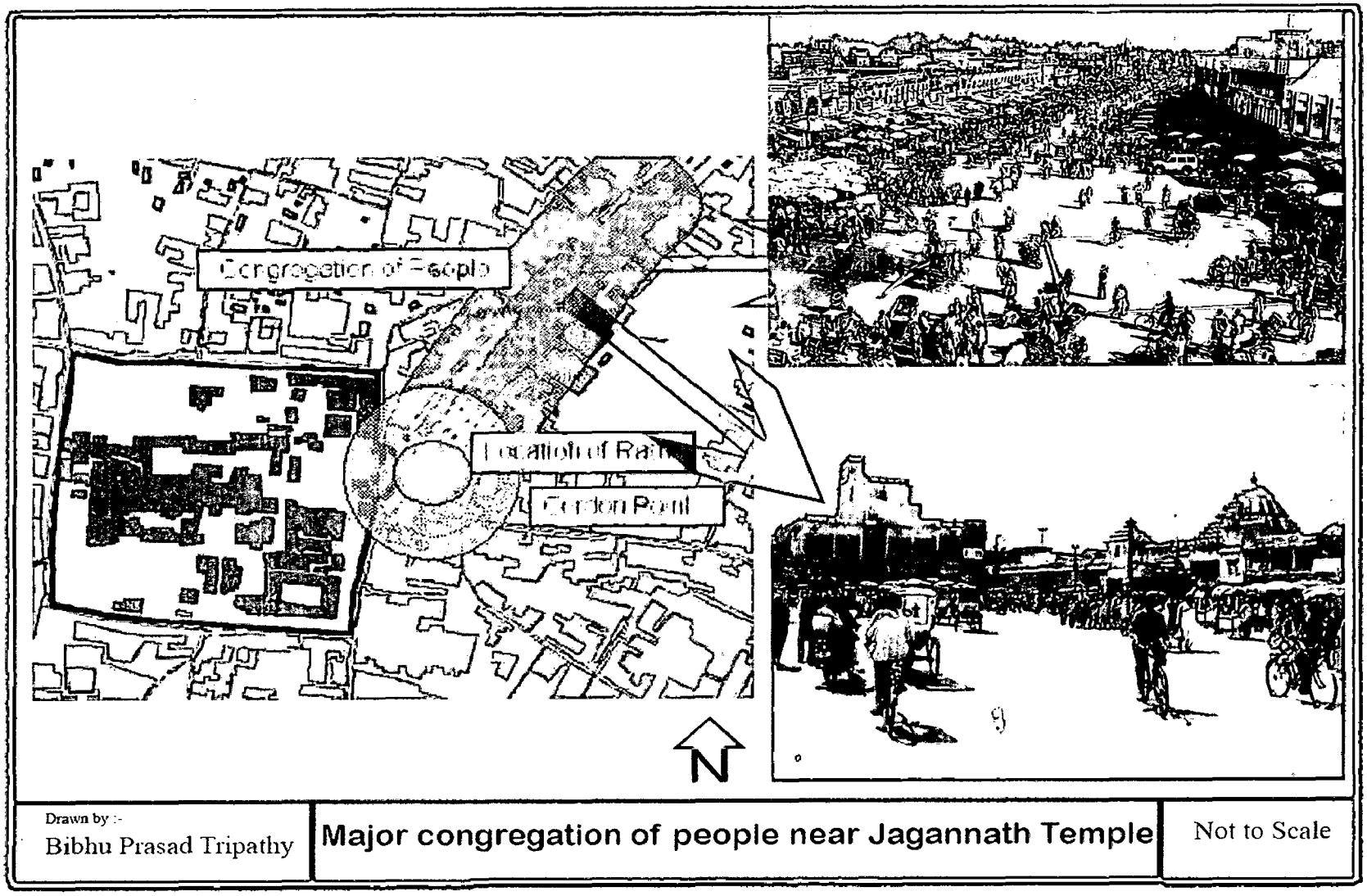


Figure 3.11: Congregation near Jagannath Temple **Source: Prepared by Author**

3.18 Traffic Issues:

Roads are being critical to ensure economic development of the city should have priorities in the agenda of the municipality and Government. Roads in the city of Puri are characterized by poor surface conditions and insufficient carriage way width to accommodate constantly increasing traffic volume. Main/ arterial roads are plagued with hawking and squatting by marginal traders, there by creating traffic congestion. By pass roads and circular access roads for restriction and diversion of traffic from the inner city is lacking. Inadequate, disorganized and non scientifically designed road furniture, signage, street light, signals, medians etc needs improvement. Road over bridges to segregate railway line and roads are absent. Inadequate greenery/ landscape along the roads with top soil exposure pollutes the air quality, environment and condition of the road. Ring roads should be encouraged to by pass the traffic direct into Sea beach are from the Atharnala. The intra city town bus services is in a very rudimentary stage giving rise to high traffic index of two and three wheeler index.

3.19 Solid Waste Management

The solid waste management is one of the most important aspects of urban environmental management and in most of the cases the most neglected too. The Puri municipality maintains the network of solid waste management in Puri city. The solid waste collection and transportation of the Puri city is carried out by the staff headed by a Health Officer. The city has been divided by 7 zones each headed by a sanitary inspector. Under each inspector there are 24 Jamadars and 464 sweepers.

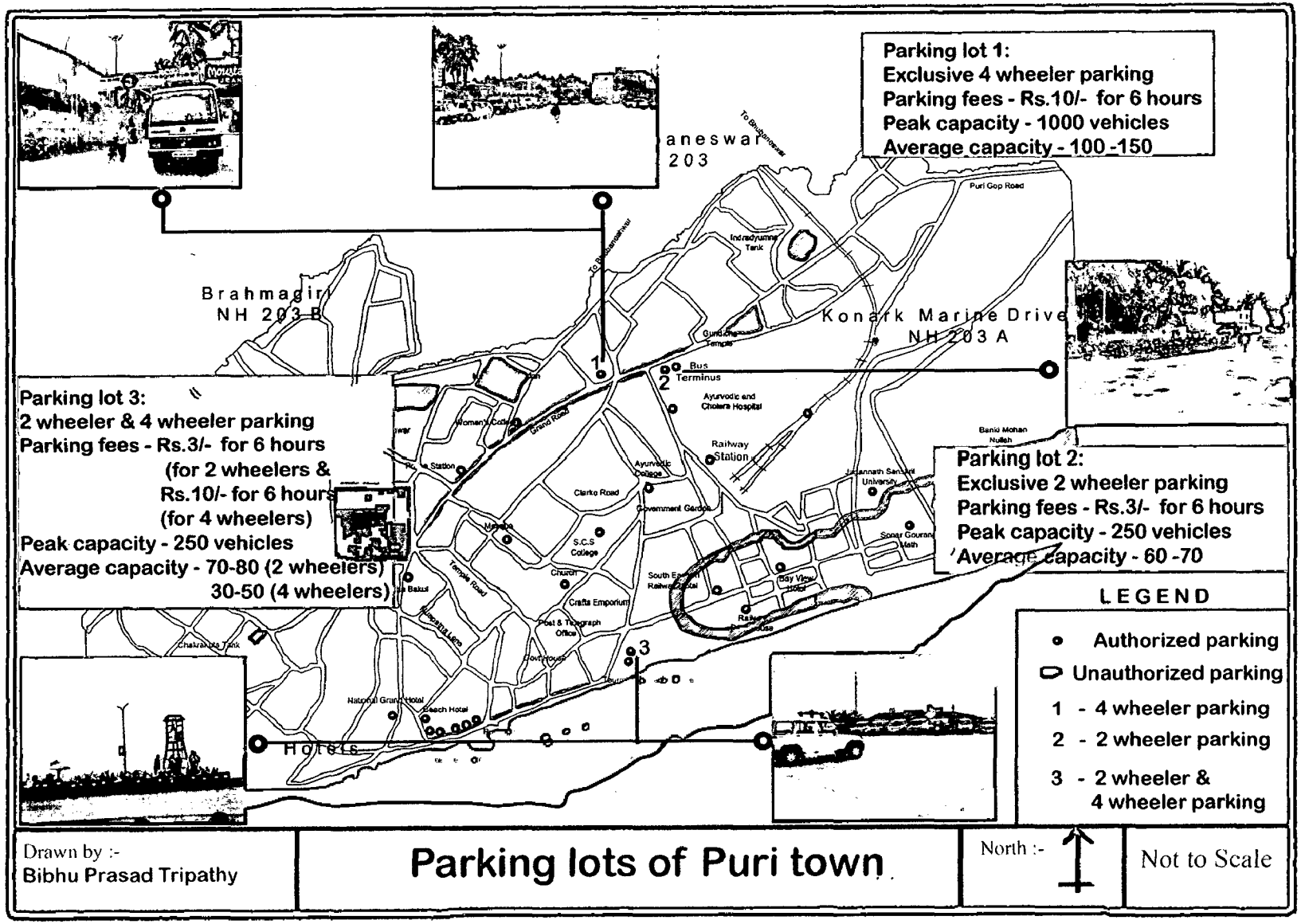


Figure 3.12: Parking lots in Puri city

Source: Prepared by Author

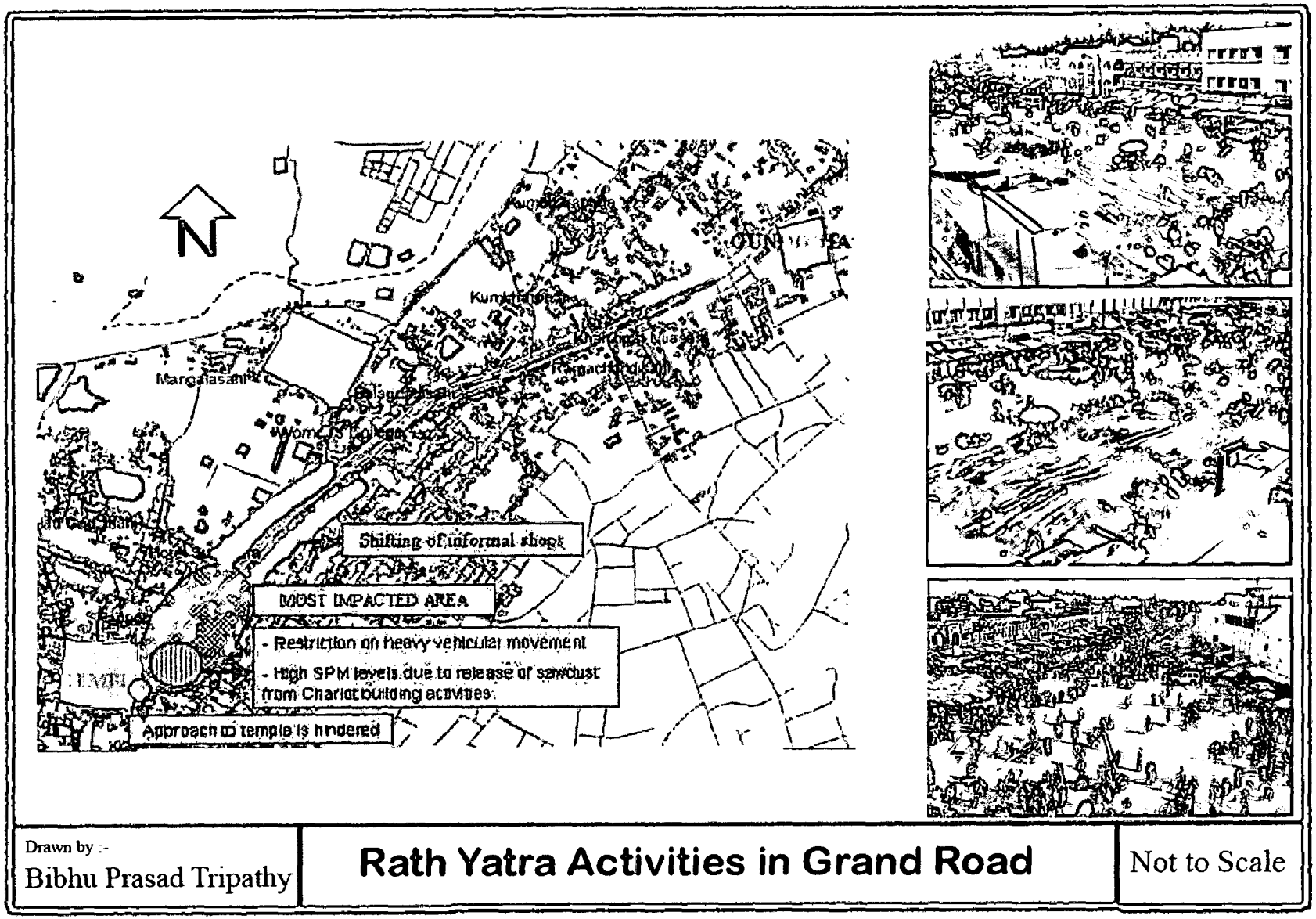


Figure 23: Map showing Ratha Yatra Activities in Grand Road **Source: Prepared by Author**

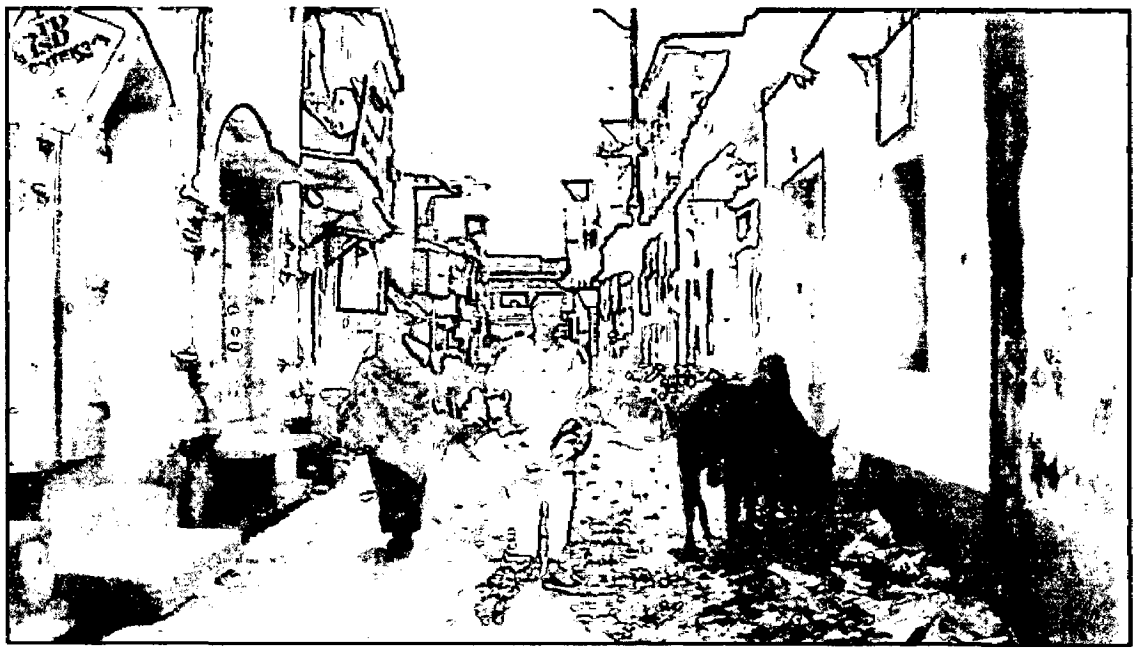


Figure 25: Waste disposed on streets

Image source: Captured by the Author

3.20 Beach Development

The city has around 5 kms of natural sea beach. The magnificent sea beach alone attracts a large number of national and international tourists to the city throughout the year [refer figure no.30]. The city is also home to world famous sand art & sculpture [refer figure no.29]. The sea shore as well as the water bodies around the city is directly linked to the rituals connected with the Jagannath temple and other festive occasions. They are equally important for pilgrim tourists.

3.20.1 Issues

There is a lack of public conveniences force the public to spoil the environment. Technological deficiencies in cleaning the beaches also pose a hindrance to beach development. Concentration of few tourists' nodes at Digabareni and Swargadwar results in the pressure on the environmental condition of the beach. The storm water discharge point at Bankimuhan causes a serious threat to the pollution of the sea. The

location of the fishermen community, close to the sea, which do not have proper and adequate toilet facilities and awareness, leads to degeneration of the quality of the environment of the golden beach. Changing rooms and toilets are not available along the beach. Informal market at evening on the beach is an added attraction [refer figure no.31] although they lack basic infrastructure and is temporary in nature.

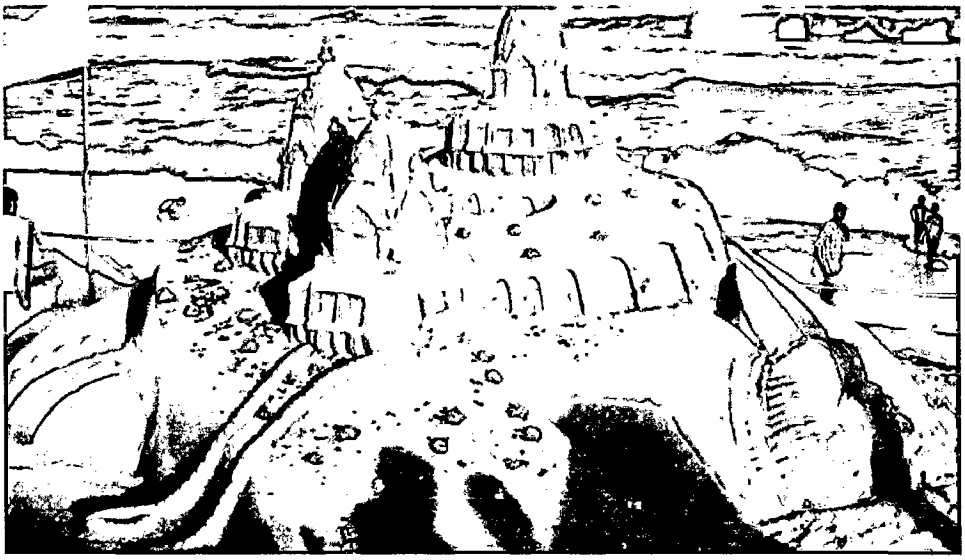


Figure 26: Sand sculpture at Puri Beach

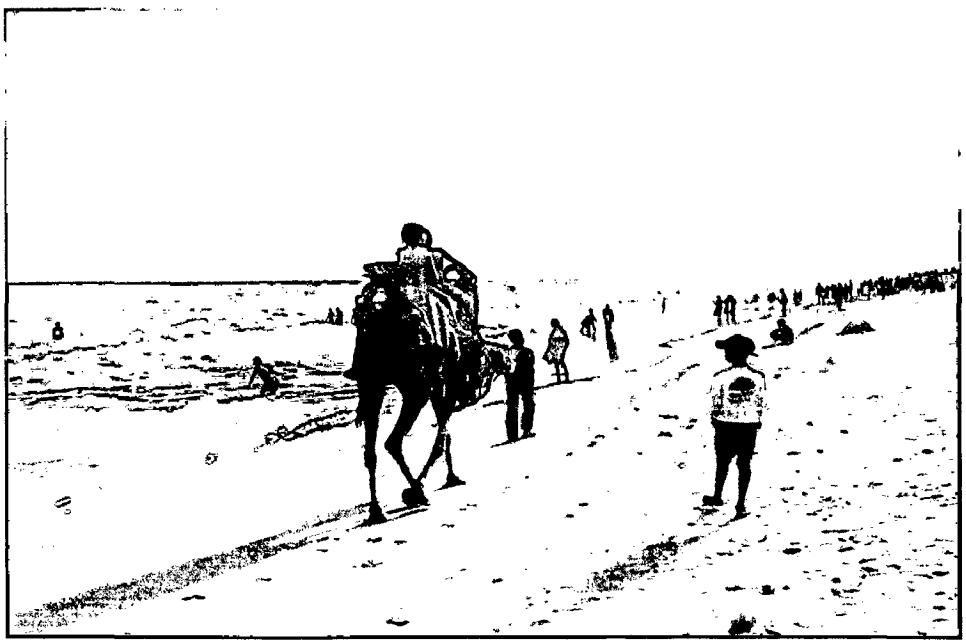


Figure 27: Tourists at Puri Beach in the evening

Image Source: Captured by Author

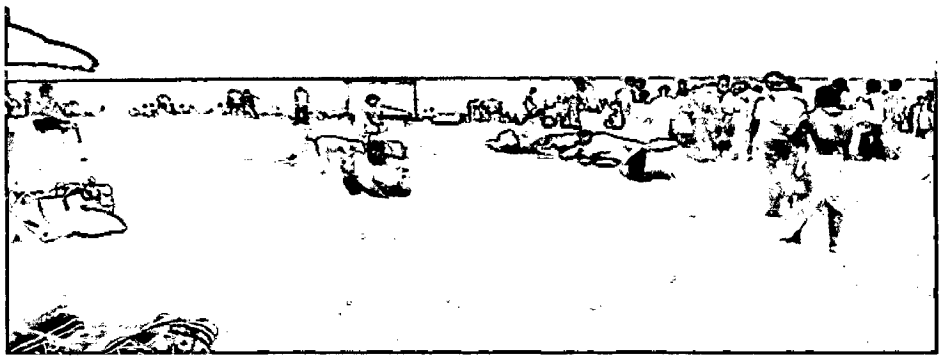


Figure 28: Informal market at Puri Beach

Image Source: Captured by Author

3.21 City Beautification

The city has a limited number of parks and green spaces within its periphery. In recent times National Aluminum Corporation has developed a patch of land in the sea shores measuring about 4.0 acres at Gandhighat. This is the only park in the town. It does not take any entry fees for the visitors. Although there are many open spaces around the city they have to be converted into green lawns.

There is also a problem of putting proper signage around the city. Most parts of the skyline in the city have been taken up by big hoardings and no hoarding control has been implemented by the urban governance whatsoever. This results in urban chaos and cluttering of the city.

3.21.1 Issues

There is a lack of organized green spaces around the city for people to go for morning and evening walk in an environmental friendly atmosphere. The environmental condition of the city remains low key as most of the open spaces are used as dumping grounds for garbage & wastes. There is also a lack of maintenance of the existing green spaces which works against promotion of new green spaces. It is astounding to learn that no detail studies have been done so far to assess the green infrastructure i.e. tree counting, tree audits, mass restoration of coastal trees etc. The role of Municipality should be more specific in creating and maintaining the green spaces. There is no hoarding control [refer figure no.32] which exists around the city. This results in a visual clutter. There is no proper signage showing important places in and around the city is

available. This result in a great deal of confusion for the tourists visiting the place for the first time [refer figure no.33].

Figure 29: Hoardings at Grand Road

Image Source: Captured by Author

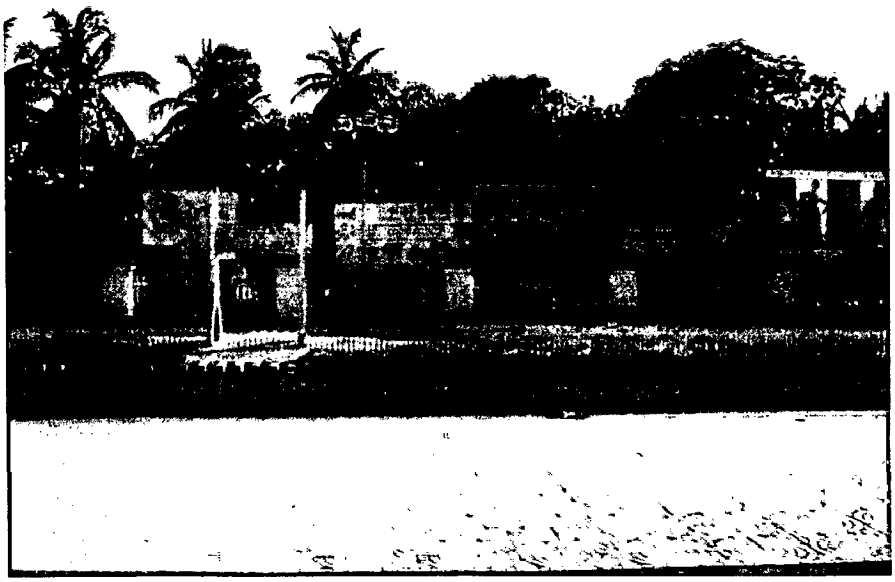


Figure 30: Signage at Puri Railway Station

Image Source: Captured by Author

3.22 Toilets

About 10 public toilets have been put up at various parts of the city. However poor maintenance of these toilets has forced people on many occasions not to use them. The numbers of toilets also seem to be insufficient to cater to the visiting population as well as the worker population (rickshaw pullers, hawkers) who come from nearby rural areas.

3.22.1 Issues

A large number of public toilets are in a very bad shape [refer figure no.35]. Only a couple of them especially along the beach are nicely maintained [refer figure no.34]. Open defecation especially by the fishermen community who live by the sea beach causes environmental degradation. Suitable land for locating public toilets in large scale needs to be identified. Mobile toilets could be a viable option to counter this problem. Financial assistance in large scale is to be made. Self help group/ communities are to be involved to counter this problem.

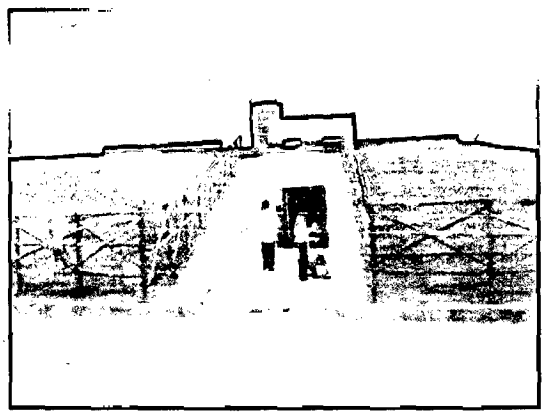


Figure 31: A public toilet at Puri Beach

Image Source: Captured by Author

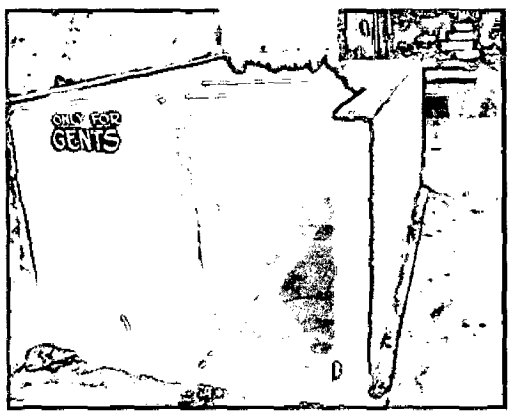


Figure 32: Public toilet near Jagannath mandir

3.23 Environmental Quality

Environmental quality is a major concern all around the world. It has adversely affected lives of millions of people and caused deaths and health disorders. Pollution is contamination by a chemical or other agent that renders a part of the environment unfit for intended or desired use. Pollution done by human activities is however the most harmful and can be controlled with a little awareness.

3.23.1 Issues

High level of SPM in the city is a cause of concern. Ratha Yatra activities along the Grand road increase the amount of SPM in the form of saw dust and other particles in the area. The number of vehicles that the city had is increasing at an alarming rate. Due to increase in the number of tourists in the city and the activities related such as mass bathing, generation of huge amount of solid wastes, increase in the number of vehicles and the noise associated with it there has been degradation in the environmental quality.

4

IDENTIFICATION & PRIORITIZATION OF PROBLEMS

After making the analysis of the physical and environmental conditions of the study area it is important to identify and then prioritize each of the problems. The problems for each group of the representative population could be different or have different priorities. This chapter attempts to identify such problems and prioritize them based on questionnaire survey as well as informal interviews conducted by the author.

4.1 Field Survey

Representative population components like the temple establishment, the hotels, lodges, shops and visitors were surveyed, using questionnaires, in order to know about the existing condition of the town and their viewpoint on the problems and needs and suggestions for future development of the town. The list of problems perceived by different population components, priority wise are given below:

4.1.1 Problems of Tourists

1. **Lack of Tourist Information Center** at railway station, bus stand. This causes mayhem for the tourists visiting the place for the first time. There is absolutely no knowledge for them about the places to visit, types of accommodation available and the types and charges of conveyances available. There are many people who take advantage of the situation and dupe the tourists.

2. **Lack of proper facilities for pedestrians** in the entire city. It is highly essential to note that the town of Puri is a *poor man's paradise* and most of the visitors here belong to a humble economic background with no means to hire taxis and auto rickshaws. And even though the landmarks to visit lie within walking distances it is very difficult for them to do so. There is a lack of proper pedestrian path, safe crossings and other street furniture.

3. **Lack of accommodation,** especially during the peak seasons and those for the poor people. The quality of accommodation available also needs to be revamped.

4. **Lack of vegetation/ tree cover** inside the city peripheries. This causes a lot of dust and noise to linger in the atmosphere and also poses a problem for the pedestrian traffic.

5. **The public lighting,** especially in and around the temples and the streets leading to them are also a cause of concern. They remain dimly lit intermittently and thus create problem for the tourists during the evening hours.

6. **Lack of toilets and changing rooms at the beach.** There are only two public toilets at the two ends of the beach which also double up as changing rooms. Most of the tourists who stay in the rooms of hotels across the road use their toilets and

changing rooms. There is a need to provide more toilets and changing rooms at an intermittent distance along the beach.

7. **Lack of watch towers near the Lord Jagannath temple and along the beach as well.** Most of the temples in Puri do not allow non – Hindus to enter their premises. Providing a watch tower near the temple would allow them to have darshan from outside. There is only one watch tower along the beach now. More number of such towers could be erected for the coast guards to keep a vigil on the tourists who take to sea bath.

8. **Lack of toilets, quantitatively and qualitatively, at places around the temple, railway station and bus stand.**

4.1.2 Problems of Shopkeepers

1. **Lack of proper parking facilities** in front of the shops, especially for the shops along the beach and the streets connecting the temple and beach.

2. Most of the **shops have to be lifted** during the Ratha Yatra period from the Grand road on to the sea beach. Most of the shopkeepers lose a part of their profit as this being the peak period.

3. **Poor condition of the city roads.** This creates problem for the shopkeepers to move their goods.

4. **Lack of a proper display space** for the shops to exhibit their items due to space constraints. There is no single avenue in the entire city where they could put their products on a better display which would also help the tourists for a better view of the items.

5. **Lack of door – to – door collection of garbage** from the shops.

6. **Lack of vegetation/ tree cover** inside the city peripheries. This causes a lot of dust and noise to linger in the atmosphere and also poses a problem for the shopkeepers.

7. **Lack of toilets, quantitatively and qualitatively,** at regular intervals along the Grand road, streets connecting the beach and the temple and along the beach as well. This forces most of the shopkeepers to urinate in the open along the public walls and street drains.

8. **Lack of public lighting** causes some of the shopkeepers to lose potential customers especially during the evening hours.

4.1.3 Problems of Hotel Owners

1. **Lack of proper sewerage system**. Most parts of the city including those along the beach and around the temple do not have a proper sewerage system. Most of them claim to have their own oxidation tanks. Although the municipality is laying sewer lines in these areas the progress of the work is slow and has come very late.

2. **Lack of steady supply of electricity.** The city has to face four hours of power cuts which hampers the business of the hotels.

3. **Lack of door – to – door collection of garbage** from the hotels.

4. **Lack of government's initiatives in conducting beach festivals.** During the lean season period the hotels have to suffer losses. The hoteliers demand to conduct beach festivals in order to increase the inflow of tourists during these lean seasons.

5. **Lack of adventure sports in the city.** Even though the city has a magnificent beach it lacks initiatives in conducting adventure sports for the tourists. This could be an added attraction for them and revamp the lean season blues for the hoteliers.

6. **Lack of toilets, quantitatively and qualitatively,** at regular intervals along the Grand road, streets connecting the beach and the temple and along the beach as well. This forces most of the general public to urinate in the open along the boundary walls of the hotels and defacing them.

7. **Poor condition of the city roads.** Most parts of the city roads are in a bad condition, somewhere due to lack of maintenance and somewhere due to municipality works. This creates problem for the tourists and thereby hampers the business of the hotels.

8. **Unavailability of a standard shopping area for the tourists.** Most of the showrooms along the beach and the Grand road maintain plush interiors but are overcrowded most of the times. They are often congested which drives the tourists off. This has an indirect impact on the business of the hotels.

4.1.4 Problems of Mandir Sewaks

1. **Lack of public toilets,** especially around the temples. This forces most of them as well as most of the general public to urinate in the open near the peripheries of the temple.

2. **Poor lighting inside the temple premises** causes a lot of problem to the Mandir Sewaks even during the day time.

3. **Lack of regular clearing of the solid wastes from the temple peripheries.** Although the wastes are cleared off everyday they get accumulated in every hour. What is needed is an hourly or a quarterly cleanup of the wastes.

4. **Insanitary and unhygienic conditions prevail inside the temple premises.** Flies, mosquitoes and other insects have infested the place. This is largely not due to lack of maintenance but because of the unawareness of the general masses.

5. **Encroachment on temple property** and temple lands by shops and hotels around the temple.

6. **Negligence in maintenance of the sacred holy tanks.** Most of these tanks play an important role during the festivals of the temple. The tanks lie in a much deteriorated condition with all sorts of wastes collected in it. Algae growth and circulation of the old water without replenishing new has rendered the water unfit for any use.

7. **Congestion in front of the main gate of the temple** as many activities as well as visitors congregate there. This causes great chaos and confusion.

8. **Poor condition of the city roads.** Most parts of the city roads are in a bad condition, somewhere due to lack of maintenance and somewhere due to municipality works.

4.1.5 Problems of Residents

1. **Lack of proper sewerage system, especially near the temple peripheries.** Most of the residences have their own tanks. Although the municipality is now providing them with the sewer lines the progress of the work is very slow.

2. **Congested streets**, especially around the temple create lots of **problem for the fire services to move along.**

3. **Frequent power cuts** make life miserable for the residing population. The city experiences a four hour power cut daily.

4. **Poor conditions of the city roads.** Most parts of the city roads are in a bad condition, somewhere due to lack of maintenance and somewhere due to municipality works.

5. **The public lighting**, especially in and around the temples and the streets leading to them are also a cause of concern. They remain dimly lit intermittently and thus create problem for the residing population during the evening hours.

6. **Lack of door – to – door collection of garbage** from the residences.

7. **Lack of public toilets**, especially around the temples. This forces most of them as well as most of the general public to urinate in the open near the peripheries of the temple and along the boundaries of the residences.

8. **Storm water drains** in most parts of the city lie uncovered which renders unhygienic conditions and breeds various types of diseases. Also there is negligence in cleaning up of the clogged drains.

4.1.6 Problems of Travel Agents/ Tour Operators

1. **Poor condition of the city roads.** Most parts of the city roads are in a bad condition, somewhere due to lack of maintenance and somewhere due to municipality works. This creates problem for the tourists and thereby hampers the business of the travel agents/ tour operators.

2. **Lack of government's initiatives in conducting beach festivals.** During the lean season period the hotels have to suffer losses. The travel agents demand to conduct beach festivals in order to increase the inflow of tourists during these lean seasons.

3. **Lack of adventure sports in the city.** Even though the city has a magnificent beach it lacks initiatives in conducting adventure sports for the tourists. This could be an added attraction for them and revamp the lean season blues for the tour operators.

4. **Unavailability of a standard shopping area for the tourists.** Most of the showrooms along the beach and the Grand road maintain plush interiors but are overcrowded most of the times. They are often congested which drives the tourists off. This has an indirect impact on the business of the tour operators.

5. **The public lighting**, especially in and around the temples and the streets leading to them are also a cause of concern. They remain dimly lit intermittently and thus create problem for the tourists and hence the tour operators during the evening hours.

6. **Lack of toilets, quantitatively and qualitatively,** at regular intervals along the Grand road, streets connecting the beach and the temple and along the beach as well. This forces most of the travel agents to urinate in the open along the boundary walls of the public buildings and defacing them.

7. **Lack of steady supply of electricity.** The city has to face four hours of power cuts which hampers the business of the travel agents.

8. **Congested roads, especially around the temple and the around the sacred water tanks** creates a lot of problem for the tour operators.

After identifying and prioritizing the problems of various groups of representative population of it is highly necessary to assess various aspects of the study area and then lay out the final proposals and recommendations. The following chapter tries to assess and sum up all these and at the end lays down the environmental improvement plan.

5

ENVIRONMENT IMPROVEMENT PLANS

landmarks, forces people to opt for rickshaws and auto rickshaws. This adds to the congestion in the traffic. It also leads to over charging by the rickshaw pullers to the high and middle income groups while the poor people who can't afford are forced to tread the roads on foot.

5.1.3 Traffic, transportation and parking

- ✓ Roads in the city of Puri are characterized by poor surface conditions and insufficient carriage way width to accommodate constantly increasing traffic volume.

- ✓ The traffic movement of the city lies in utter chaos. There is no grade separation between the slow moving and fast moving vehicles.

- ✓ There are too many intersections along the Grand road from the collector streets and that too at very short intervals. Most of these intersections are unregulated and unmanned. This slows down the traffic often.

- ✓ Almost all the vehicles that visit Puri have to cross the Grand road to go anywhere in the city although the need not. This is because there is no alternative route for the vehicles. They should be encouraged to travel straight to the beach along a bypass road. This would divide the traffic and minimize the congestion inside the city.

- ✓ Main/ arterial roads are plagued with hawking and squatting by marginal traders, there by creating traffic congestion.

- ✓ The intra city bus transport service is at a rudimentary level. This adds to the chaos in the traffic.

- ✓ At present the parking lots in Puri are working much below their peak capacities almost all round the year. At peak periods too, the facility offered is sufficient. Hence at present there is no need to increase the capacity of the parking lots.

5.1.4 Drainage and Sewerage

- ✓ Almost 80 – 90 % of the drains in the city lie uncovered. It becomes an absolute eye sore especially at places frequented by the visitors like along the beach and nearby the temple. The drains at the civil lines area are the only ones in good

shape. Rest of them either has holes in them or are partially broken or entirely uncovered.

- ✓ At present the municipality is undertaking the project of laying the sewer lines. But the progress of the work is very slow. The roads have been dug up at places adding to the woes of the people.
- ✓ Most of the drains are stagnant with silt and garbage thrown in them. The stagnant drains pose severe sanitation problems and health risks.
- ✓ The Bankimuhin River is now converted to a large sewage drain (refer figure no.36). They pose risks of overflow and flooding in the rainy season.
- ✓ Due to unsanitary conditions posed by these storm water drains, about 0.9 m to 1.5 m space by the side of the drains was practically being unused thereby reducing the width of the road.

Figure 33: Bankimuhin River - now a large sewage drain

Image source: CDP, Puri

5.1.5 Urban Design Quality

- ✓ The city lacks in organized planned green areas. There is only one park in the entire city which is near the sea beach developed by the National Aluminum Corporation. The inability to maintain the existing green areas proves to be a handicap in planning newer green areas.

- ✓ Lack of proper signage at important places like railway station, bus stand and places of tourist importance leads to chaos and confusion. The large hoardings which hug the skyline of the city add to this chaos.

- ✓ The open drains and indiscriminate dumping of garbage leads to the degrading of the urban design quality of the city.

5.2 Barriers to sustainable environmental development

- ✓ **Lack of general awareness** amongst the people (residing and visiting) is the first and foremost barrier towards achieving a sustainable environmental development of the city.

- ✓ **Lack of funds** from the governments and other non – government bodies also pose as a hindrance. The temple of lord Jagannath is reportedly one of the richest in the entire country. But the authorities of the temple are more concerned towards development of the temple and its premises rather than the entire city. Also much of the funds are mismanaged by the temple authorities and the municipal bodies due to improper planning strategies.

- ✓ **Lack of infrastructure** like good quality roads, hotels and restaurants severely limit tourist traffic in the city. Sanitation and waste disposal system are almost neglected in the entire city. Lack of waste disposal system and proper sewage treatment plants lead to the pollution of the sea and unsightly and unhygienic and rubbish dumps scattered all around. Similarly drainage systems are blocked and stinky, deterring the tourists from staying in certain lodges.

- ✓ **Lack of good linkages with the peripheral cities.** Although the city is connected to the capital city of Bhubaneswar through the national highway – 203 and through railways also, the present condition of the highway remains much to be desired. The entire stretch highway has been encroached by

small villages enroute and creates bottlenecks as soon as one enters any settlement.

5.3 SWOT analysis of the environmental condition of Puri city

Table 5.1: SWOT Analysis of Puri city

Strengths	Weaknesses
• Beauty of the location • Religious attraction of the area • Heritage buildings & architecture • Variety of attractions – temples, beaches, bathing spots etc • Safety – relatively low crime rate • Handicrafts – filigree work, sea shell works	• Lack of infrastructure – such as clean drinking water, roads, waste disposal etc • Shortage, low quality, slow privatization of accommodations • Low promotion by the government • Low computer usage – no quality websites, no online reservations • Scattered attractions – combined with poor infrastructure makes tour difficult and expensive
Opportunities	**Threats**
• Interest among tourists – both national and international • Availability of technical and skilled advice • Establishment of new seaside resorts • Improvement of infrastructure – transport, accommodations etc	• Slow process of action by the government • Overly bureaucratic regulations for developing the opportunities • Wavering government support for tourism development • Potential negative impacts – pollution by sewage, garbage etc

5.5 Recommended Improvements in sustainable environmental development

5.5.1 Along the Grand Road

I. There has to be a grade separation among the traffic. The lanes should be marked properly and distinctly. As the Grand Road hosts the Ratha Yatra and has to contain a large gathering throughout the year no permanent built up structures like road dividers or kerbs are possible to be recommended here. The division and marking could be of temporary nature (refer figure 5.2).

II. The entry into the Grand Road from the collector streets has to be regulated such that vehicles cannot just rush in straight to the Grand Road. Some of the entries have to be closed down while some have to be regulated.

III. There has to be provision for a covered pathway along the Grand Road. A space of 4 -5 meters (depending upon the availability) could be taken up on both sides of the Grand Road for this purpose. This would also create an extra space for the people to walk and view (along the roof top of the walkway) during the Ratha Yatra and otherwise also (refer figure 5.2).

IV. Facilities like drinking water fountains, telephone booths, sitting spaces and toilets have to be provided at regular intervals (refer figure 5.2).

V. Pedestrian crossings have to sufficed at important junctions along the Grand Road (refer figure 5.2).

VI. A watch tower/ vantage point has to provided along the Grand Road for the non – Hindu visitors (who are not allowed into the temple) for a view of the temple premises from outside. This point could be preferably on top of the Lord Jagannath Temple Committee office. The temple office could levy some ticket for the view (refer figure 5.2).

VII. Street lamps and public lighting has to be improved around the temple as well as the Grand Road (refer figure 5.2).

VIII. Small trees and plants in large concrete flower pots could be provided along the road to decrease the noise pollution and dust pollution (refer figure 5.2).

IX. Two – wheeler and three – wheeler parking could be provided along the Grand Road while four – wheeler parking has to be discouraged.

X. The hotels and dharmshalas along the Grand Road have to be densified so as to contain more number of tourists. The quality of the stay has also to be improved especially for those pilgrims who are poor and under privileged (refer figure 5.2).

5.5.2 Along the Sea Beach

I. Vehicles could be encouraged to take a bypass route from the Atharnala to the Sea Beach and there by avoiding the congestion of the Grand Road. For this the road along the sea beach has to be widened and foot over bridges (at least three) has to be provided (refer figure 5.2).

II. A covered pathway along the hotels facing the sea beach could be proposed as in Grand road with facilities like telephone booths, drinking water fountains, resting places etc (refer figure 5.2).

III. The existing footpath along the sea beach has to be widened (minimum 4 – 5meters wide). Sea facing sit outs with dust bins at every 100 meters, stand alone street lamps, water fountains could be provided on the footpath.

IV. Parking for the hotels and commercial establishments can be provided in front of them. (Refer figure 5.2).

V. Changing rooms and toilets have to be provided along the beach within a gap of at least 500 meters (refer figure 5.2).

VI. Palm trees and coconut trees could be planted along the sea beach to reduce noise and dust pollution and improve the quality of the view.

VII. Watch towers should be provided at an interval of 500 meters.

VIII. The hotels and other establishments along the sea beach have to be densified so as to contain more number of tourists. The qualities of the hotels have also to be improved (refer figure 5.2).

5.5.3 Along the streets connecting the Jagannath Temple and the Sea Beach

I. The streets connecting the temple and the beach are already very narrow (average 3 – 3.5 meters in width). Hence the commercialization of these streets which were essentially residential has to be regulated.

II. The entire stretch could be preferably pedestrianized. Public amenities like toilets, drinking water facilities and landscaped pathway could be designed so that the tread is not tortuous.

III. The entry of vehicles to these areas should be regulated with time and direction or both.

6

IMPLEMENTATION STRATEGIES

The success of any plan depends upon how well the plan provisions and proposals are implemented in a phased manner. The key to satisfactory functioning of the city to meet the demands of various situations is efficient management of the available resources.

Hence this chapter lays down various implementation strategies that could work for enforcing the improvement plan laid out in the earlier chapter.

6.1 Implementation of short – term proposals

Many of the short – term proposals could be undertaken and completed in the first phase itself like conducting public awareness camps, lying of the sewer lines, improving the street furniture and providing public facilities. This could be achieved by the involvement of various functional departments in an integrated manner and also to regulate and manage, the development interests of the resident stake holders as well as other private parties from outside.

6.2 Development controls

The main regulatory provisions of development controls are as follows:

I. All developments (inclusive of construction of new building and structures, remodeling, renovation and replacement of old buildings, structures and infrastructure works) need prior approval from the PKDA.

II. No encroachment shall be allowed on government/ departmental land, roads, paths and public places.

III. No development or activity or use of machinery, equipments, and appliances within the heritage area and sea beach will be allowed which pollutes the environment.

IV. No development or activity or use of machinery, equipments, and appliances within the heritage area and sea beach will be allowed which disturbs the serenity, peace or divinity of the religious city.

V. The allowable ground coverage and FAR for various building types in various wards may be decided after a detailed study of the plot sizes, characteristics and ownership patterns.

VI. There has to be a architectural control on the street facades along the Grand Road and along the sea beach. The elevational treatment along these roads should be in harmony with each other and this could be decided by the Municipality and the PKDA collectively.

VII. The conversion of designated land/ building uses in different wards may not be allowed except with the approval of the PKDA.

6.3 Role of management techniques

Just as development is guided and shaped by the instruments of zoning control, building bye laws etc, the problems of traffic, accommodation and infrastructure functioning need to be efficiently managed with the appropriate technologies, deployment of skilled and dedicated man power and application of relevant technologies. These can play crucial role in

- ✓ Traffic management
- ✓ Visitor accommodation
- ✓ Waste management
- ✓ Pollution Control
- ✓ Keeping the city safe, secure and clean

As a first step, a Traffic Management Cell needs to be set up at the district HQ which would operate, during peak yatra season, in key centers like Pipili, Sakhigopal and Chandanpur apart from Puri. It could also enlist volunteers from the general public as well as senior students, NCC cadets. With the help of help of wireless telephony, computerized management, and other e – governance techniques, mini bus service and dedicated seasonal work force the peak traffic and parking problems can be efficiently managed now and in the future.

Similar in the case of visitor accommodation, the first step is to create a database of the available accommodation and the facilities available and then upload to the official website of Puri. The next logical step is to make online reservations operational from anywhere across the globe. The accommodation for the economically challenged has to be revamped and is to be provided with the basic facilities to start with. The existing Visitor Information Center along the beach needs to be revamped and similar centers need to be put near the bus stand and the railway stations. They should create the database discussed earlier and must be willing to help the new comers to town.

There is an urgent need to ban the use of plastics and other throw – away containers etc in the city. These materials could be recycled to make useful articles and this in turn could employ a part of the dependent population of the city.

Another most important aspect to be pondered over is the number of stray cattle moving along the streets of the city. They could be captured and bounded in some *"goshala" in the city outskirts.* This could lessen the traffic chaos in the city and also give shelter to the homeless cattle population. The cattle, especially cows are found to have many medicinal uses. Cow dung and its urine also could be used for ayurvedic medicines.

6.4 Funding

Although some seed money has been allocated for the Ecocity project there is still a need for generating funds through conventional ways like levying taxes on public facilities - pay and use toilets, entry fees for parks, parking fees etc. The fund thus collected could be utilized for further developmental projects. There is a need to rope in private players/ investors for various developmental projects who could be stakeholders to it. These projects could operate on a BOOT basis (Build Own Operate Transfer) where in both the private investors as well as the government and the people in general would be benefitted.

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ANNEXURES

ANNEXURE - 1

SURVEY OF RESIDENTS IN PURI

1. Name of Owner –
2. Address –
3. Staying since –
4. Your impression about Puri Very good Good Disappointing
5. What do you like most about Puri? What are the strengths/ merits of Puri?

6. What problems did you face in Puri? What are the demerits/ weaknesses of Puri?

7. Suggestions for improvement of tourism in Puri (Indicate priority, if possible)
   - Plant more trees/ vegetation
   - Improve beach & facilities available
   - Improve city roads
   - Improve upon beach festivals
   - Provide slow moving, eco friendly public mode of transport like trams etc
   - Provide more public toilets/ changing rooms
   - Improve accommodation in terms of quality/ quantity
   - Introduce adventure sport
   - Provide more toilets around the temple complex
   - Improve public lighting inside & around temple complex
   - Improve sewage and storm water drainage system

ANNEXURE – 2

SURVEY OF VISITORS IN PURI

1. Name –
2. Coming from –
3. Purpose of visit Sight seeing Pilgrimage Other specify
4. Duration of stay –
5. Have you visited Puri before - Y/ N
6. Your impression about Puri Very good Good Disappointing
7. What do you like most about Puri? What are the strengths/ merits of Puri?

8. What problems did you face in Puri? What are the demerits/ weaknesses of Puri?

9. Suggestions for improvement of tourism in Puri (Indicate priority, if possible)
   - Plant more trees/ vegetation
   - Improve beach & facilities available
   - Improve city roads
   - Improve upon beach festivals
   - Provide slow moving, eco friendly public mode of transport like trams etc
   - Provide more public toilets/ changing rooms
   - Improve accommodation in terms of quality/ quantity
   - Introduce adventure sport
   - Provide more toilets around the temple complex
   - Improve public lighting inside & around temple complex

ANNEXURE – 3

SURVEY OF TRAVEL AGENTS IN PURI

1. Name of the agency –
2. Location: Ward –
3. Name of the owner –
4. Year of establishment –
5. Type & number of vehicles -
6. Tour packages provided -
   -
   -
   -

7. Suggestions for improvement of tourism in Puri (Indicate priority, if possible)
   - Plant more trees/ vegetation
   - Improve beach & facilities available
   - Improve city roads
   - Improve upon beach festivals
   - Provide slow moving, eco friendly public mode of transport like trams etc
   - Provide more public toilets/ changing rooms
   - Improve accommodation in terms of quality/ quantity
   - Introduce adventure sport

ANNEXURE – 4

SURVEY OF SHOPS IN PURI

1. Name of the shop –
2. Location: Ward –
3. Name of the owner –
4. Year of establishment –
5. Shop category -
6. Suggestions for improvement of tourism in Puri (Indicate priority, if possible)
    - Plant more trees/ vegetation
    - Improve beach & facilities available
    - Improve city roads
    - Improve upon beach festivals
    - Provide slow moving, eco friendly public mode of transport like trams etc
    - Provide more public toilets/ changing rooms
    - Improve accommodation in terms of quality/ quantity
    - Introduce adventure sport

ANNEXURE – 5

SURVEY OF *MANDIR SEWAKS* IN PURI

1. Name –
2. Age –
3. Job type/ alternate job (if any) –
4. Annual income –
5. Number of days employed in a year-

6. Suggestions for improvement of tourism in Puri (Indicate priority, if possible)
   - Plant more trees/ vegetation
   - Improve beach & facilities available
   - Improve city roads
   - Improve upon beach festivals
   - Provide slow moving, eco friendly public mode of transport like trams etc
   - Provide more public toilets/ changing rooms
   - Improve accommodation in terms of quality/ quantity
   - Introduce adventure sport
   - Provide more toilets around the temple complex
   - Improve public lighting inside & around temple complex

ANNEXURE – 6

SURVEY OF HOTELS IN PURI

1. Name of the hotel –
2. Location: Ward –
3. Name of the owner –
4. Year of establishment –
5. Facilities provided -
   - Parking facilities
   - Clean drinking water
   - Travel agent/ tour guide
   - Other recreational facilities

6. Accommodation capacity Roor Peak
7. Waste disposal

   Solid waste: Throw out
   Collection by munic cify

   Sewage: Soak pit Oxidation tank
   Sewer line

8. Suggestions for improvement of tourism in Puri (Indicate priority, if possible)
   - Plant more trees/ vegetation
   - Improve beach & facilities available
   - Improve city roads
   - Improve upon beach festivals
   - Provide slow moving, eco friendly public mode of transport like trams etc
   - Provide more public toilets/ changing rooms
   - Improve accommodation in terms of quality/ quantity
   - Introduce adventure sport