

WEB LAB WITH THE CITY OF BHUBANESWAR AND THE DELEGATION OF THE EU IN INDIA

December 2020

PROJECT REF. NO. EUROPEAID /140-160/DH/SER/IN

CONTRACT NO. PI/2019/412-536

ACTIVITY NO. 4.2.2.2.1.

ACTIVITY DESCRIPTION ORGANISATION OF SUSTAINABLE URBANISATION PLANNING WORKSHOPS (METROPOLITAN LABS) IN MINIMUM 6 DIFFERENT CITIES IN INDIA (ONE IN MUMBAI, ONE IN DELHI; THE OTHER CITIES WILL BE DETERMINED AT A LATER STAGE)

SPECIFIC ACTIVITY DEVELOP SPECIFIC CURRICULA FOR AND ORGANISE 2 WORKSHOPS PER YEAR (OF MINIMUM 1 DAY) FOR MINIMUM 25 PARTICIPANTS IN EACH OF THE CITIES

TYPE OF DOCUMENT EVENT REPORT (BHUBANESWAR WEBLAB)

This report was prepared with the financial assistance of the European Commission. The views expressed in this report are those of the consultants and do not necessarily reflect those of the European Commission.

This project is funded by the European Union



and implemented by AETS



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I. Introduction

The India-EU Urban Partnership Programme (IEUP) aims at contributing to strengthening EU urban diplomacy and leadership in the context of the new Urban Agenda and the Paris Agreement. The IEUP is a continuation of the support provided under earlier EU funded programmes in India. The specific objective of the project is to develop and operationalize the partnership for smart and sustainable urbanization for India and EU.

One of the key deliverables under the project is the planning and delivery of Metropolitan Labs with 6 cities over the 3 years of the programme (2020-2023). The second such Lab was done with the city of Bhubaneswar on the web because of the difficulties of doing a physical lab at this time (COVID -19 pandemic).

The objective of the Lab was to provide new insights and support the city of Bhubaneswar in master planning in the post COVID era. Bhubaneswar has the distinction of being first in the competition under the Smart City Mission of the Government of India and, has a history of piloting innovations that are national best practices. The city is also important from the heritage perspective and is located within short motorable distance between large cities that are tourist attractions. Bhubaneswar is a 'primate' city and is under threat from unplanned urbanization and climate shocks.

Facilitated by Mr. Pedro B. Ortiz, an internationally renowned Metropolitan Planner, the Web Lab focused on 'structural planning' improvements/approaches that Bhubaneswar could consider for structured urban development. The **Agenda** is included in **Annex 1**.

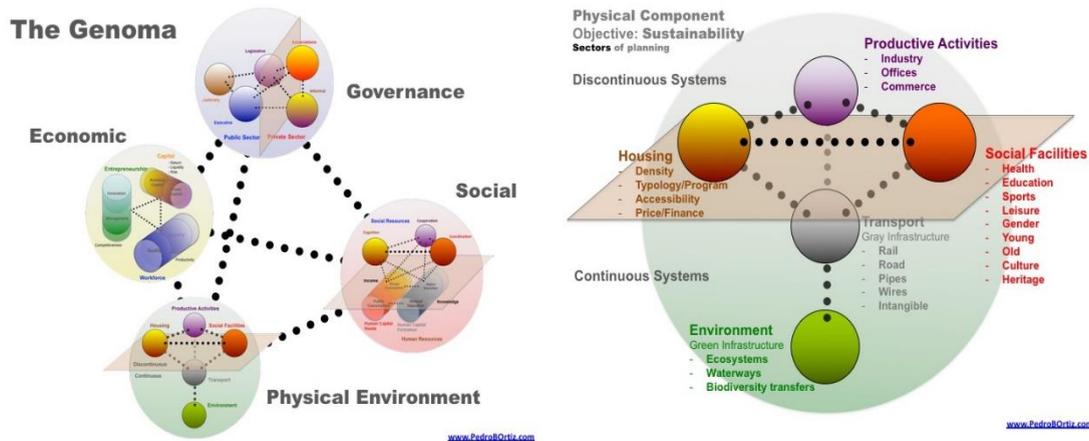
II. Technical Report on Web Lab

Bhubaneswar Metropolitan Workshop methodology and objectives

Metropolises are complex structures, much more complex than cities. They are the largest investment humankind has ever made and account for 75% of the world GDP. As such they should be managed at highest efficiency and social equity, within a framework of long-term sustainability, security, and resilience but, these elements are missing in metropolitan management. The complexities in metropolises makes them function rather more like countries than cities. Their genomic components are not just transport, environment, or housing, but are at a higher level of complexity. Social resources, economic productivity, legislative frameworks, are aspects that supersede local administration of any city resolved to address infrastructural and services provision.

a. Metropolitan management: Components and Sectors

There are four components in Metropolises - Economic, Social, Physical, and Institutional. Economy seeks 'efficiency'; Social seeks 'equity'; Physical seeks 'sustainability', and Institutional Governance seek 'equilibrium'. These components are often competing for limited resources. The economy needs accumulation of indivisible capital to perform. This accumulation goes against an equitable share among all citizens, especially those that need it the most. The struggle among the components must be addressed and solved by Governance, within the fair play of the different institutions set up for that purpose.



The four Components of the metropolitan Genoma and the five sectors of the Physical

Each of these Components have 'elements' and, historical literature for each has identified these in different forms: Branches of Government, Administrative Tiers, Social Resources, Economic Factors or Urban Sectors. Metropolises must address these elements concurrently with the additional difficulty of any of the elements working at cross purposes with each other. Any conflicts must be foreseen to avoid mishaps due to ignorance since these can have social and economic consequences as well as sustainability disruption and institutional confrontation. This is to be done both in Managing and Planning the Metropolis

b. Metropolitan planning: Strategic and Structural

There are two ways of approaching Metropolitan Planning: Strategic and Structural.

- **Strategic:** When all the 4 components are involved in Planning: Economic, Social, Physical, and Governance.
- **Structural:** When only the elements (Sectors) of the Physical Component are addressed: Environment, Transport, Housing, Productive Activities and Social Facilities.

The Strategic discussion is too complex to be dealt in a Metropolitan Web Lab since it involves the discussion of the many elements of the integral Metropolitan Genoma. It is for this reason that the Bhubaneswar Metropolitan Web Lab focused on just the Physical Components and its sectors. In the one week allotted for this exercise, a few projects that could be taken up in detail in future were identified.

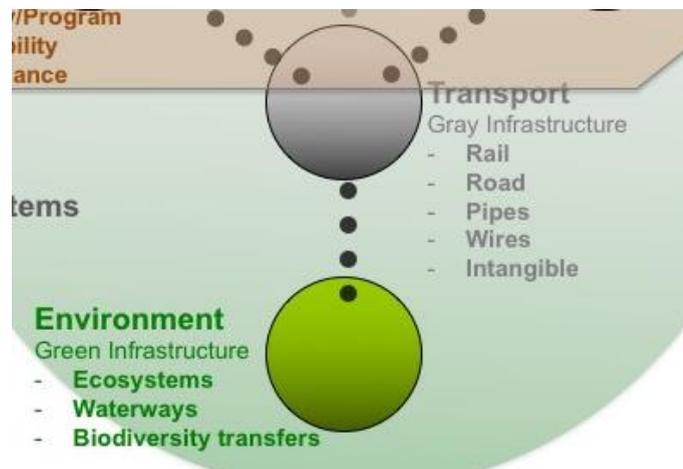
c. Workshop expected results

In the limited time and resources, the workshop provided an integrated vision for the next 30 years, i.e., up to 2050. The vision laid out the metropolitan dimension Bhubaneswar would have acquired by that time, multiplying its built footprint, and reaching a population close to 7 million.

a. Specific Sectors' integrated development that the WebLab focused on are:

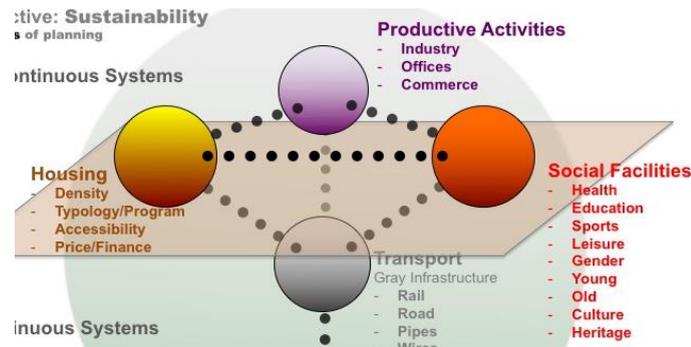
- **Environment:** The given capital that must be preserved and enhanced. The solid ground upon which wealth and equity must be developed preserving its integral capital and benefiting just from the dividends. Quality environment has not only to be protected and preserved, but it must also be enhanced and improved. Free from aggressions from the other sectors it can impose its rules to be benefited rather than jeopardized.

- **Transport:** The backbone of the metropolitan structure that must serve the Land Use sectors, without disturbing essentially the Environment sector. Transport is to be seen to serve the Land use sectors, and not the other way around. Transport must listen to the Land Use needs and location strategies to provide the required accessibility so, it must serve, and not rule. In the metropolitan scale, discussions around transport are larger than typical urban modes such as buses, trams, or BRT's. These modes of transport are inadequate for metropolitan scale trips, and only to be integrated in a system for complementary local urban scale services.



The 2 continuous sectors to be compatibilized; Environment rules, Transport serves.

- **Housing:** This is a sector where the private sector has a significant role. However, the private sector must find affordable and adequately located and served buildable land. The private sector cannot take charge of long-term negative externalities, nor of public infrastructure that serve social means. That is why the public sector must define, promote, and incentivize the private sector to service land in the right places. That is the role of a Metropolitan Housing policy that goes beyond the simple aggregation of a city corporations limited approach.
- **Productive Activities:** Industry, Commerce and Offices that support the economy and the productive system, each has subsectors and rules of location and adequate relation to the other sectors and subsectors. Efficient location to interact with value added activities in the supply chain is critical for efficiency. However, polluting activities establishment of incompatibilities with the Housing and Environment sectors must be overruled for its short-term gains in the most suitable locations. This is an issue of externalities the private sector is not capable of handling right.
- **Social Facilities:** The large array of social needs such as Education, Health, Care to social groups as age, gender or youth, Leisure, Sports that are essential for the quality of life for the population that defined a developed society. Services and facilities that were unthinkable some centuries ago or even decades that are now at the very core of the definition of an equitable society. By 2050 Bhubaneswar should have reached that level. While it is a long-time horizon, a start must be made now with this Metropolitan snapshot Structural Plan.



The 3 discontinuous sectors that establish the Land-Use location policies

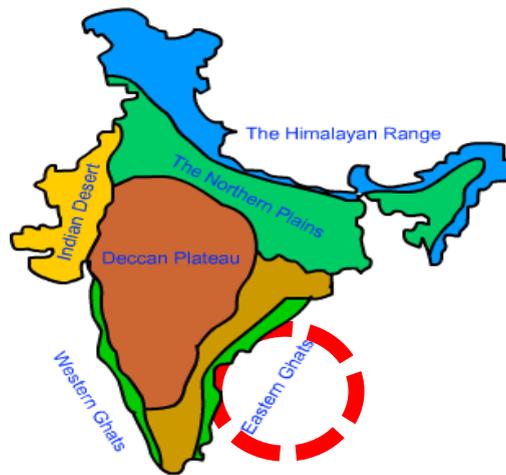
b. Integration in time, scales, and sectors

The workshop aimed at producing an integrated vision for Metropolitan Bhubaneswar 2050. This vision aims at benefiting the metropolis for the benefit of its parts: the municipalities. If the Metropolis performs well in economic, social, and institutional terms it will be because of the physical territory. However, an integrated vision is not enough. Each of the sectors must work well on their own, serving the others. Out of this performance improvement we must highlight the priority projects that, after the required Feasibility study, Cost-Benefit analysis, and Opportunity Cost evaluation, will prove to be quick-wins to invest in and trigger the next set of actions. This comprehensive approach will develop the metropolis for the next 30 years. Bhubaneswar is today a USD 3.000/Capita Metropolis, it should aim to reach USD 20.000/Capita.

Bhubaneswar Metropolitan structural analysis

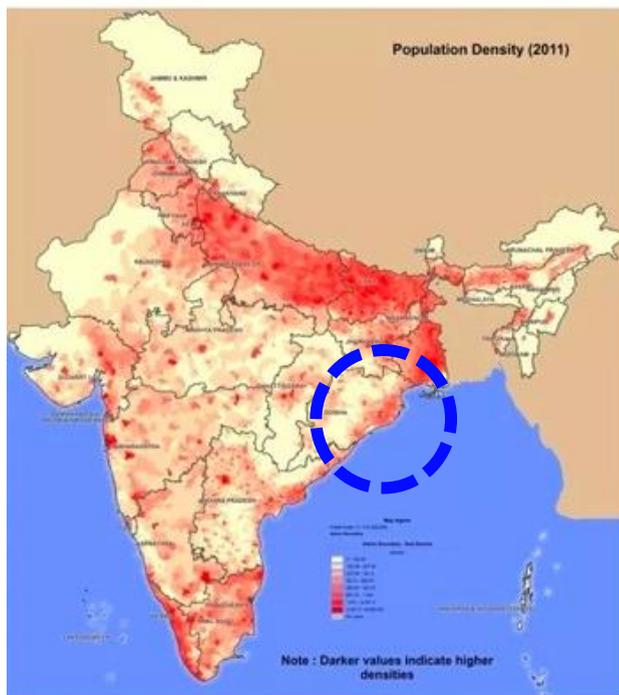
1. What does Bhubaneswar want to be in 2050?

Bhubaneswar is not in a privileged position - too far north from Chennai to be on the world trade routes between Europe and China; too close to Kolkata to compete on the trade between India and China at the mouth of the Ganges as the natural gateway to the Northern Plains. The location advantage of Bhubaneswar is its geological particularity that produces the mineral wealth that, in places, is easy to extract and easy to export. Extractive economies do not produce wealth if the outcome is exported at low prices to compete in global markets. Transformative production of these raw material assets are the ones that produce the added value required to reach wealth. Bhubaneswar has not yet reached that goal. The alternative possibilities should incorporate an industrial policy to provide these materials with the transformation required to reach higher value before export. Such industries must be located either at origin or in the pathway to export. But in any case, away from the urban centers to avoid impacts of pollution, congestion and risks produced by heavy weight transport. Proximity to rail access might be as well a requirement.

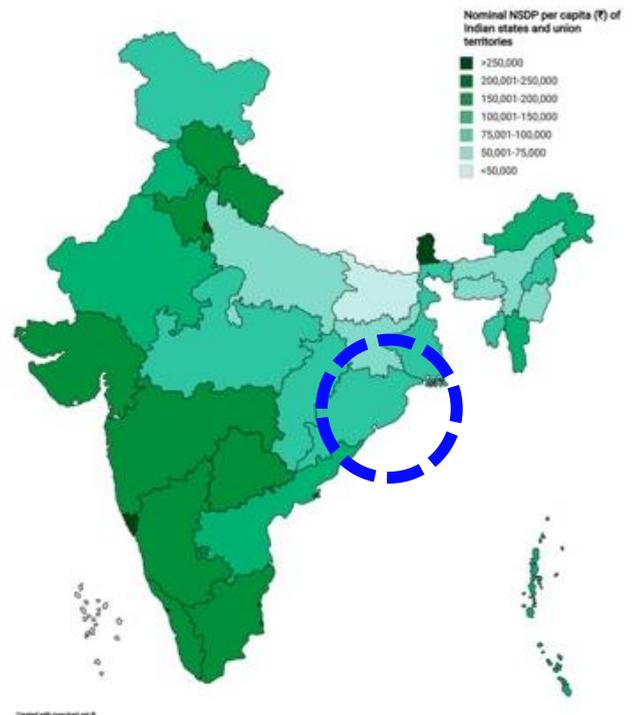


Geological crop out of Deccan Plateau geology at Odisha coastal plain

Apart from this strategic asset, Bhubaneswar is not on the main trade routes, international or national. Population density is mainly in the Northern Plains of the Ganges Valley and higher productivity areas with higher GDP are in the western Delhi-Mumbai corridor. Bhubaneswar has to find its own strategy for development since its location does not necessarily imply an exogenous force to promote development.



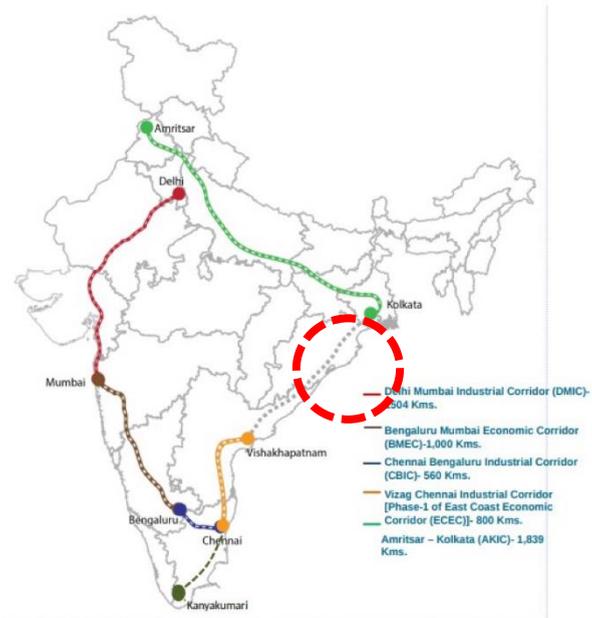
Population density



GDP / capita

2. What can Bhubaneswar do?

Bhubaneswar is located along the East Coast Corridor (a strategic corridor established by the National Government) and must target a complementarity role to the economies of Kolkata and Chennai. This corridor is not one of the priorities but, Bhubaneswar cannot wait for it to become a priority and must promote itself. The East Coast corridor benefits Bhubaneswar and so, it has to prepare its territory to take maximum advantage of the Corridor by locating the right functions at the right place and thus make it urgent and necessary for the corridor to be built. This approach will contribute to making the Corridor efficient and productive from the start and its construction even more necessary and urgent, pressuring national government to set it in place as economic and social benefits would be jeopardized if delayed. This must be, from start, one of the strategies of the Bhubaneswar Metropolis Structural Plan (OMSP).



Significance of Industrial Corridors in India

3. Bhubaneswar Metropolis topographical setting

The structure of the metropolis is strongly determined by its topographical setting. The Bhubaneswar metropolitan region is located on the coastal plain delta of the River Mahanadi. The boundaries of this region are as follows.

- Metropolitan four-corner post structure

Bhubaneswar metropolis with Cuttack (Historic) and Bhubaneswar (New Town) as its main centers is intrinsically related to the topo-geographic situation. Cuttack is located at the origin of the delta, an advantageous location for defence and communications and like Cairo in Egypt at the origin of the Nile delta. Bhubaneswar, as a New Town does have other location strategies less rooted in the understanding of the territory. Complementary to these main urban centrality areas there are some other strategic urban centers determined as well by the topography. These are:

- Puri, at the southern tip of the delta avoids the hazards of the floodable plain and reduces difficulties of river crossing for movement.
- Paradip, as the port at the mouth of the main branch of the river delta maximizes the benefits of river accessibility from the inland.
- Brahmapur and Balasore (Bhadrak) as the gateways of the metropolis along the coastal line of communications.
- Angul as the centre of mineral extraction.
- Anandapur and Kishoreprasad as secondary gates to the river valleys penetrating the mountain massif.

These towns will be part of the overall structure of the metropolis in future.

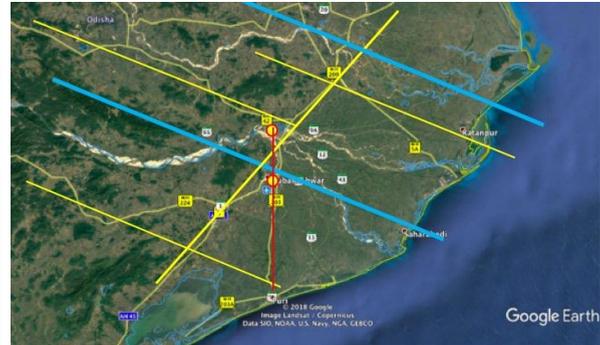
- Topographical features

The coastal plain is a result of siltation from the rivers descending from the Deccan Plateau via the Eastern Ghats. The delta is in a palm shape with the directrix line in a southwest – northeast foothill line parallel to the coast. The generatrix has its parallel gradient lines,

mainly to the coast. The generatrix is the roughly perpendicular one that forms the river valleys cut out from the Deccan Plateau, and the ridges among them. Communication lines, the inherited infrastructure already reflect this topographical structure.



Generatrix and Directrix in Odisha Metropolis



Territorial Strength Lines reflected by inherited infrastructure

It must be noted that these two axes upon which the metropolis is built are well reflected in the layout of the rail-track system. Urban centralities have been served and ‘promoted’ by this rail track system. This double cross is the DNA of the Metropolis and structural development must be empathic and compatible with the DNA.



Main directionality and secondary transversal directionalities of Odisha Metropolis

4. Development response to metropolitan DNA

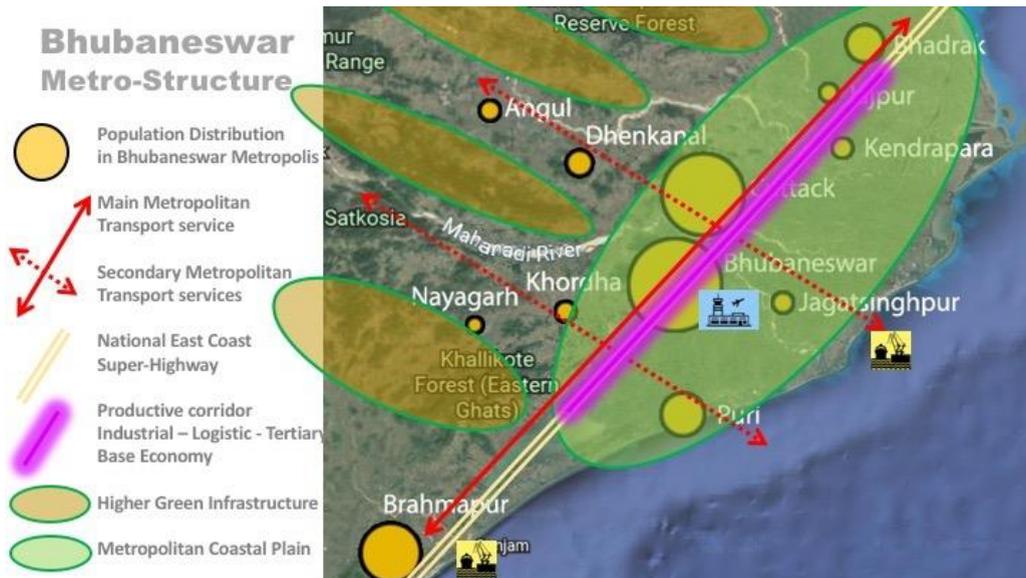
- a) **The transport system** - The East coast corridor from Kolkata to Chennai has only two possible layouts either to the east or the west of Cuttack and Bhubaneswar. To the west it would confront topographic difficulties as the foothills are already infringing on the borders of the metropolis therefore, it will have to be laid out to the East. This does not prevent as possible future alternative of local character to the West.



The backbone and ribs structure of Odisha metropolis

From this backbone structure the 'ribs' of the metropolis, (perpendicular to the vertebrate the inland with the seacoast) provide penetrating and homogeneous accessibility to all metropolitan structure both for the benefit of the location of productive activities and accessibility to the different metropolitan functions. However, this homogeneous accessibility should not be interpreted as an invitation to sprawl. Residential location should be prioritized on the mass public transport system (rail intermodal stations) as social facilities on the intermodal stations.

- b) **Productive location** - Industry requires direct access and cannot be located within the urban fabric as heavier trucks required should avoid the urban fabric. The trucks pollute, congest, and introduce risk. Industries should therefore be in the periphery - the brownfields left behind would be excellent locations to regenerate the urban fabric with social facilities, environmental assets, and dense housing. In the periphery there are two potential locations for industry - the ones that require **rail-&-port** access for very heavy load products (Coal, steel, etc.) and the ones that require **highway & airport** access for products with higher added value per kilo, that will take air routes to access international markets that will pay more for the output products. Bhubaneswar should target the later as they are the ones that produce higher benefits and wealth. With these criteria, the priority location for production is either the East Coast Corridor for the added value industries and the junction of train and road for the heavier industries. The train brings the materials form the extraction areas and takes the output to both ports (Paradip and Brahmapur).

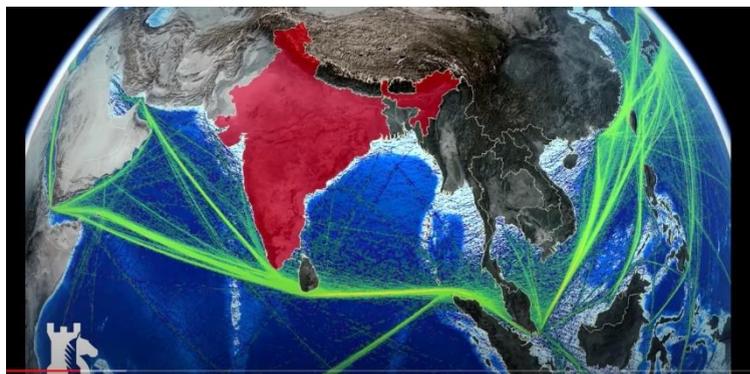


The Odisha Productive Corridor along the National Highway East Coast Corridor

The Bhubaneswar Productive Corridor (industry and tertiary) along the layout of the East Coast National Highway corridor should be a priority project for the Metropolis. The layout of the national highway should be defined as soon as possible, land reserved and even acquired, at **zero cost**, as part of the developments that would take place along that highway. The Plus Values on that accessibility advantage would pay for the cost of the land in excess and the construction of the corridor if the State Authorities prove to have the political capacity to manage it – there are several international examples of such cross benefits.

The development of the economic corridor, even before the construction of the highway will trigger, foster, and finance the urgency of its construction. Proactive metropolitan management means promoting things to happen. This political management attitude is the main difference between economies that produce 60.000 USD/Capita GDP, from those that produce just 3.000 USD/Capita.

- c) **Airport and Seaports** - Complementary to the land transport system that determines the location of the production system due to the carriage of freight, the final product needs to access markets. The more these products find their place in international markets of higher acquisition power the wealthier the metropolis will be. Thus, not only the products produced must target the needs and demands of those markets beyond the 30.000 USD GDP/Capita but must have the means to place the products in these markets competitively. That is the role of the airport and seaport. With preference for the airport, as air



freight has much more added value than sea freight. As a matter of fact, the share of agricultural sea freight in India exports is 90% of volume by sea but only 70% in value. The value of the air cargo goods is 4 times larger than sea cargo just for agricultural products.

Bhubaneswar has two ports - Paradip and Brahmapur. Expansion plans are underway and will be discussed in subsequent sections of this report. Connections by train and road already exist but need to be improved. These connections will also provide alternative locations for productive activities. The airport is essential. It is the umbilical cord that connects Bhubaneswar with the world. It is the item that makes Bhubaneswar global and can make it reach 30,000 USD GDP/Capita targets interacting with metropolises at that wealth level. Bhubaneswar airport is small, is growing very fast and cannot be expanded in the actual location. It is urgent and essential to look for a new location.

The Biju Patnaik Airport is presently experiencing a monthly growth rate of 73.3 % in the total aircraft movement. This remarkable growth rate may be attributed to the introduction of private low cost airlines in Bhubaneswar. The quarterly figures of the aircraft movements in the airport for June 2005 (April to June) and June 2006 are 251 and 435 respectively. In contrast, the aircraft movements in Bangalore for the June 2006 quarter were 6921.

Data on the actual difficulties of Bhubaneswar's airport

The location of the new airport must consider the following:

- i. Located as close to Bhubaneswar and Cuttack as possible. When the airport has huge passenger and freight volumes the land transport time and economic costs multiply if the airport is distant.
- ii. Located along the National Corridor/Productive Corridor for easy access to heavy loads and freight.
- iii. Located to the east of the corridor to avoid congestion and have scope for expansion.
- iv. Located on grounds that allow for complementary activities and multiplier synergic effects.
- v. Runways must follow the dominant wind pattern and flight cones do not jeopardize environmental quality (noise and pollution) of existing and future residential zones.



New Airport location east of Bhubaneswar and National East Coast Highway Production Corridor

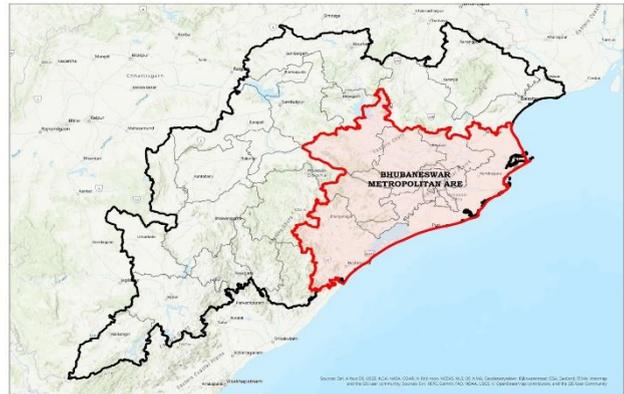
With these determinant factors several locations are possible. Among these the one closest to Bhubaneswar, to the east, beyond the Mahanadi Delta River branch and the National Highway

Corridor. There is no train access at this point, but airport freight does not use train (high value and low weight goes by truck) and a specific monorail can link it to the central rail station of Bhubaneswar and provide accessibility to the intermediate land. This way this land will multiply its value and with an adequate land policy developed by the Bhubaneswar Authorities that value can leverage finance for the necessary infrastructures both grey, green, and social.

The new Bhubaneswar Airport should have reserved land for at least for 4 runways (80 million passengers) and industrial areas that, if necessary, can provide room for expansion if 80 million passengers are reached. The airport connection to the city main rail station centrality will provide access not only to the airport, but also to the areas that can become the airport city and a sustainable expansion for Bhubaneswar residential and tertiary land uses. Flood plains must be protected and thoroughly enforced to prevent future hazards and risks. Development of the expansion can be produced at zero cost if the adequate management is implemented. Other freight airports are possible within the region provided their flight cones are compatible with this international airport.

Environment

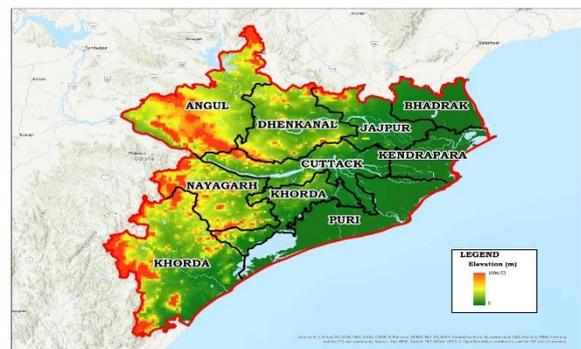
Bhubaneswar Metropolitan Area is located on the coast of the Bay of Bengal in the state of Odisha. It is surrounded by the Ghats on all the other three sides. The Metropolis has several reserved forests and sanctuaries that cover the Ghats and run between the urban centers. The Metropolis is bisected into two parts by the Mahanadi River and falls in the Mahanadi River Basin area. The Mahanadi has 3 tributaries within the metropolis and reaches the Bay of Bengal at four different locations. The Metropolis also has Ghats of elevation 1285 m and low lying are of -50 m. and some major lakes such as Chilika Lake and Rengali Reservoir. In addition, the Metropolis has a very long coast of 270km to the east.



Location of Bhubaneswar Metropolitan Area

Forest Cover

The Metropolitan area is surrounded by Ghats on the north, east, and south sides with the slope being towards the east. The highest elevation of the Ghats is seen at the western sides of the Khorda, Nayagarh, and Angul Districts and the elevation reduces towards the east. The Metropolitan region has important sanctuaries and forests. The existing green cover is disjointed and sporadic and to some extent this green cover helps in concentration of urban centres. However, there is encroachment happening especially in Bhubaneswar between the Chandhaka and Chudan Gharg forests. Encroachments are also seen in the Cuttack region and the Cuttack – Angul region.



Elevation of the Metropolitan Area



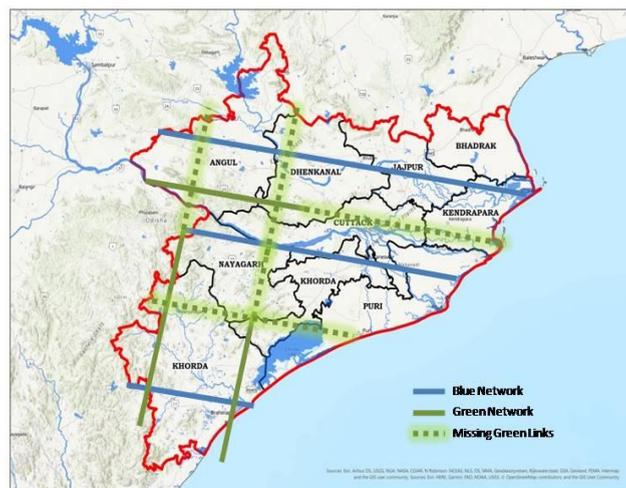
Development between Chandaka & Chandan Gharg Forests



Development in the Cuttack – Angul districts

Blue Network

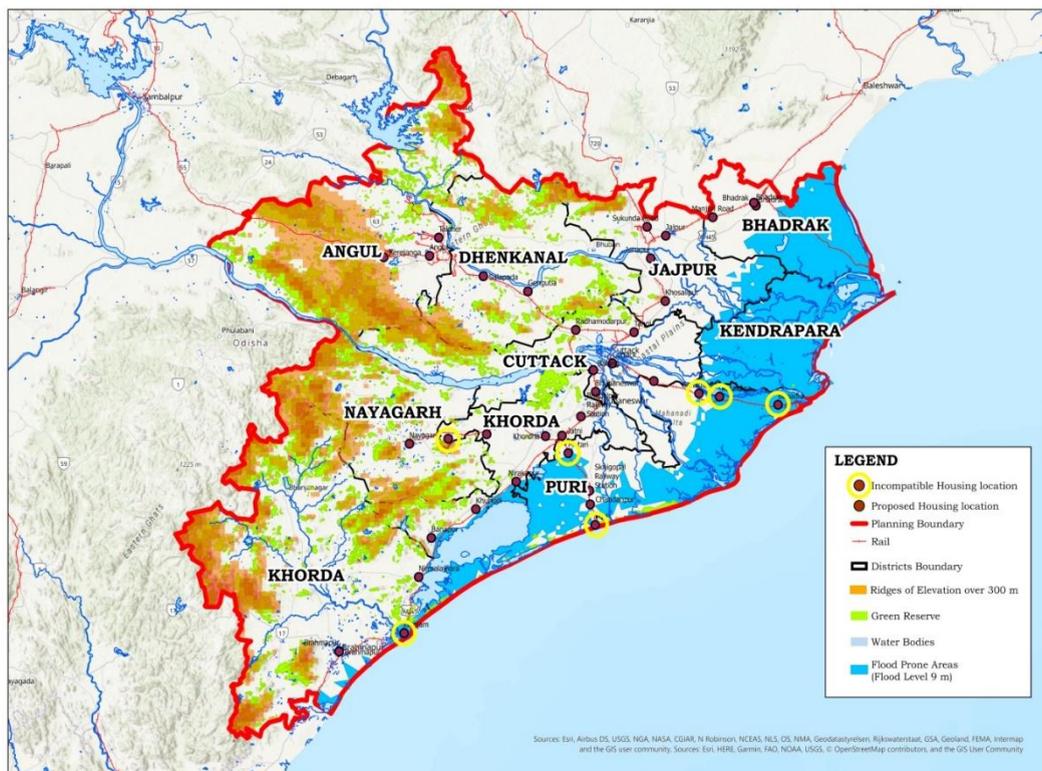
The Mahanadi River runs through the Metropolis and is divided into 5 tributaries and reaches the Bay of Bengal. The Brahmani River is seen to the north and reaches the Bay of Bengal at Dhamra. The Rushikulya River running on the south of the metropolis reaches the Bay of Bengal at Ganjam. These are the major rivers running through the metropolis and these are the major source of water for the entire metropolis. All these rivers are non-perennial rivers most of these rivers and dry during summer. In the rainy season, all these rivers carry a huge amount of water and they cause severe disasters and casualties. It is very essential to avoid development close to the river. The metropolitan region also has some major lakes such as Chilika Lake, Surad Ghal, Thenga Reservoir, Hirakud Reservoir, Salandi Reservoir, and Dhanadhar Reservoir. All these reservoirs are silted and are not able to store water up to its capacity. Meanwhile, all these reservoirs are also facing the threat of encroachment and pollution.



Missing links in the existing green and blue networks

Environmental Hazard Areas

The Metropolis faces cyclones and floods every year. To mitigate the situation new development should be restricted to safe areas. Flood modelling was done for a flood height of 9m to identify the flood-prone areas. The rivers flowing through the Metropolis are getting polluted because of the mining and industrial activities. Apart from the rivers and lakes, there are natural drains that carry rainwater from the urban centers to the rivers and sea. Natural drains that carry rainwater from Bhubaneswar are getting clogged more often and it causes water stagnation and epidemic. Some parts of the city's natural water drains have been encroached.

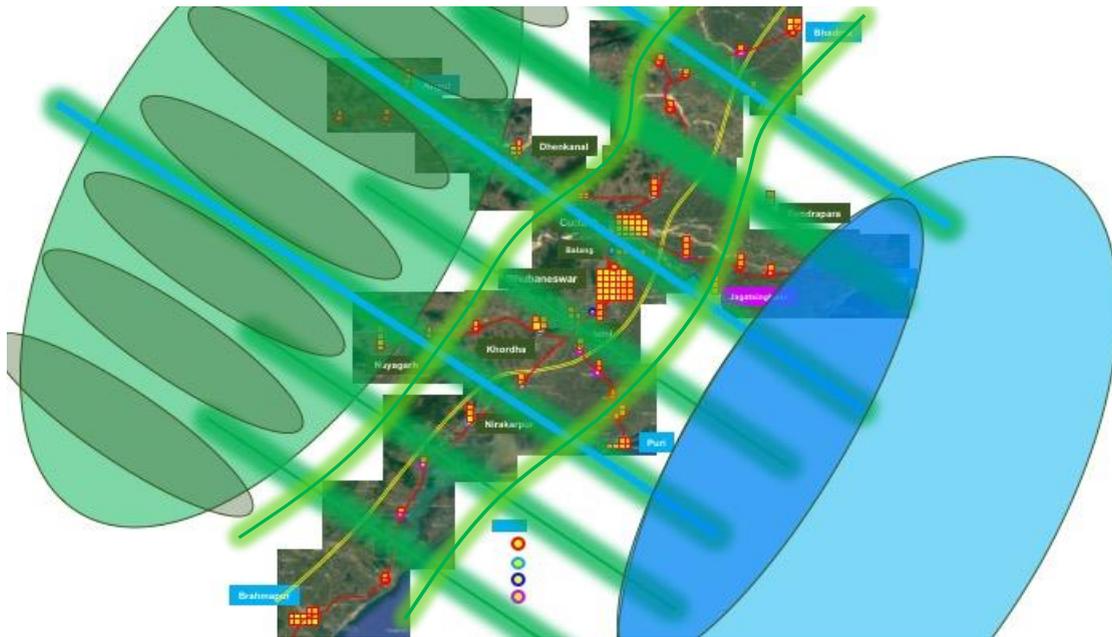


Environmental Assets & Hazardous Areas and Incompatible Housing Locations

Incompatible Housing Location

In the existing scenario, settlements are in 38 locations and the demand for housing in all these locations is huge. But 7 of the existing locations fall in environmentally sensitive or disaster-prone areas. So new development should be restricted in these locations. The regulatory measure should be taken and development in these centers should be curtailed. The housing demand of these urban centers should be provided in the closest urban centers. The incompatible urban centres are Puri, Chandanpur, Skhigopal Railway Station, Ganjam, Bagadia and Kotakana.

To contain the development several policies, need to be formulated. Policies such as Water Corridor, Green Corridor, Blue zone, and eco-tourism belt are proposed to protect the environment and to protect development from disaster. The analogical illustration of the development concept is shown in the diagram.



The concept for environmental development in the Bhubaneswar metropolis

Green lines running from west to east is a green corridor that is to be protected or developed. The green line running from north to south is illustrating the need for developing a tourism belt so that major tourism spots, transport, and the environment are connected. Blue line running from west to east illustrates the rivers and drain and all these rivers and drain need to be protected from encroachment and these water bodies must be maintained. Green Circle on the western side indicates the Ghats and forests. The blue circle on the east side indicates the sea and flood-prone areas. The dark blue circle on the east side indicates the flood-prone areas of the metropolis. The whole concept is to protect the green and blue network and to contain the urban centre from sprawling and merging to form the big concrete jungle.

Blue Zone

Blue zones are close to a river basin and eco-sensitive zones where development must be climate adaptive and eco-friendly.

Policy intervention: Bhubaneswar Metropolitan Authority (BMA) to designate a Climate Adaptive Design of structures in the Blue zone. No, build within 100m from the edge of the coastline.

Proposed Project: Form-based codes that will apply climate-adaptive design to structures built in the Blue Zone with special engineering requirements; application of nature-based solutions such as Bioswales, mangrove planting etc. as applicable.

Water Corridors

One of the major issues in the urban centres in the metropolis is water stagnation because of improper drainage management. The development of the metropolitan region must be in coordination with the Mahanadi River Development Authority.

Policy intervention: Enhanced coordination of BMA with Mahanadi River Basin Authority to ensure the protection of natural drainage patterns and reduce clogging and siltation of tributaries of the Mahanadi River Basin.

Proposed project: Nature-based solutions and implementation of easements.

Green Corridor

A green corridor is the network of reserved forests, water bodies, wetlands so that all the existing networks can be connected to and protected and preserved. The assessment has shown incompatible development and encroachments.

Policy intervention: BMA to establish linkage of existing forest reserves, wetlands for protection and conservation.

Proposed project: Establishment of nature trails, signage, educational ecotourism development.

Tourism Belt

The Metropolitan Area has high potential for tourism development with good rail network.

Policy intervention: BMA to establish an Ecotourism Belt to create a continuous network.

Proposed project: development of adequate green infrastructure such as bike-e-shuttle lanes, etc.

Proposals at Metropolitan Level

Green Network around the River:

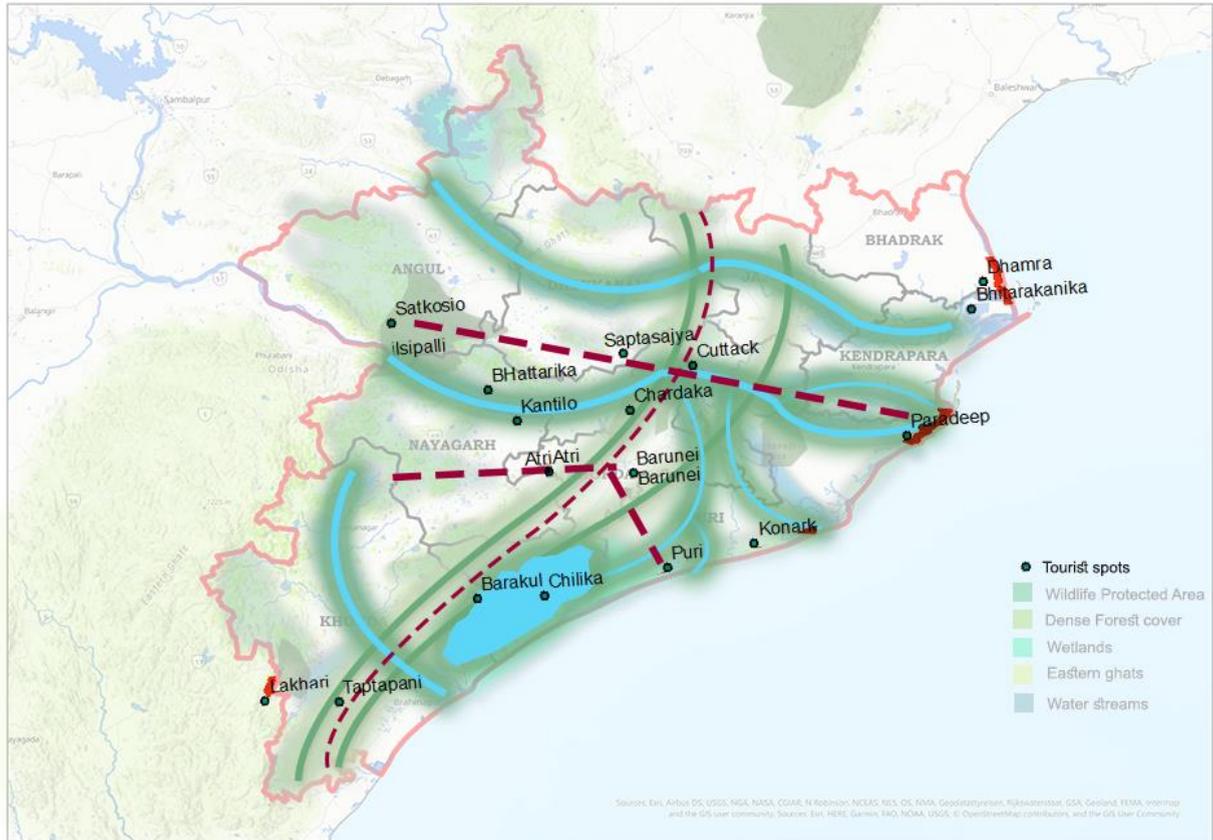
The map shows continuous green and blue networks at the meso level, where the Green network is developed around the rivers, which will act as a buffer between the river and urban development, to protect the river from human intervention and further pollution and protect urban areas from flooding.

Flood Prone Zones:

Flood prone area is demarcated through GIS Flood analysis by taking into consideration the contours and mean sea level. The flood-prone area is demarcated at a level of 9m. In this area, settlements will not be encouraged to grow further and any city-level infrastructural facility like Airport, Railway station will not be developed here. The detailing of permissible infrastructural and other guidelines is to be finalized in consultation with the Disaster Management Authority, District Development Authorities, Local Authorities, Irrigation and Water dept. etc. with implementation and monitoring being done by local authority.

Coastal Regulation Zones:

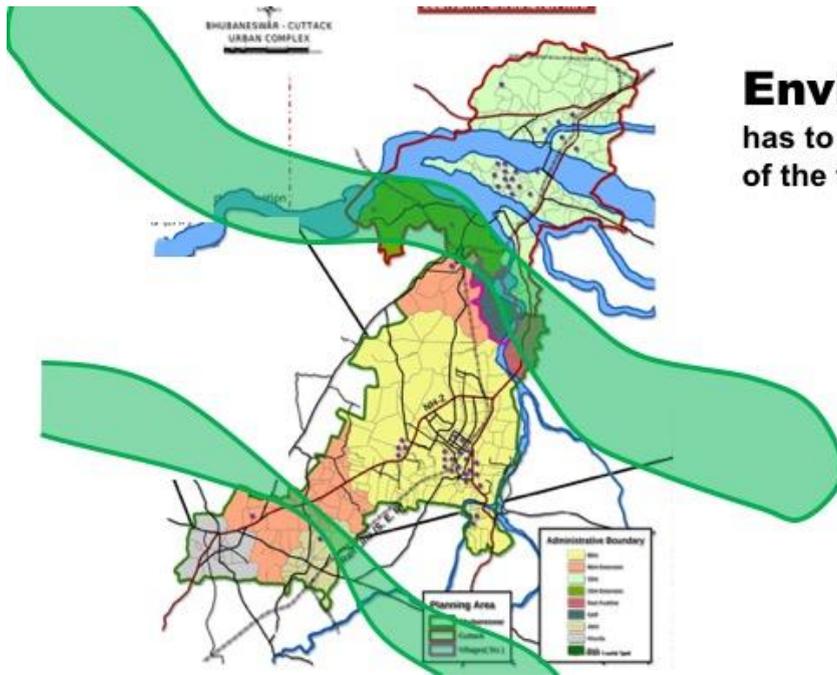
CRZ norms are already defined by the Central and State government and a certain area i.e. 500 m from the coastline is demarcated. In the identified area only recreational and temporary activities shall be permitted.



Blue, Green and Tourism network development at Metropolitan level

Integrated development of Bhubaneswar & Cuttack Region

The concept for the development of an environment in the Bhubaneswar and Cuttack region is to restrict the merging of Bhubaneswar and Cuttack. This is achieved by developing a green belt on the north of Bhubaneswar. Daya river flowing on the east side of the Bhubaneswar can also be used as bound to avoid Puri and Bhubaneswar growing and merging. As of now there is no strategy in the development plan prepared by the Bhubaneswar Development Authority in keeping the Urban Center like Bhubaneswar and Jatni separated. To avoid merging Jatni and Bhubaneswar a green belt should be developed. To restrict urban centers from growing and merging, projects the following projects are proposed.



Environment has to prevent the mergence of the three urban systems

Concept for environmental development of integrated Cuttack & Bhubaneswar region

Project 1:

Developing a Green Corridor between Bhubaneswar and Cuttack with the available agricultural land reserved forest areas

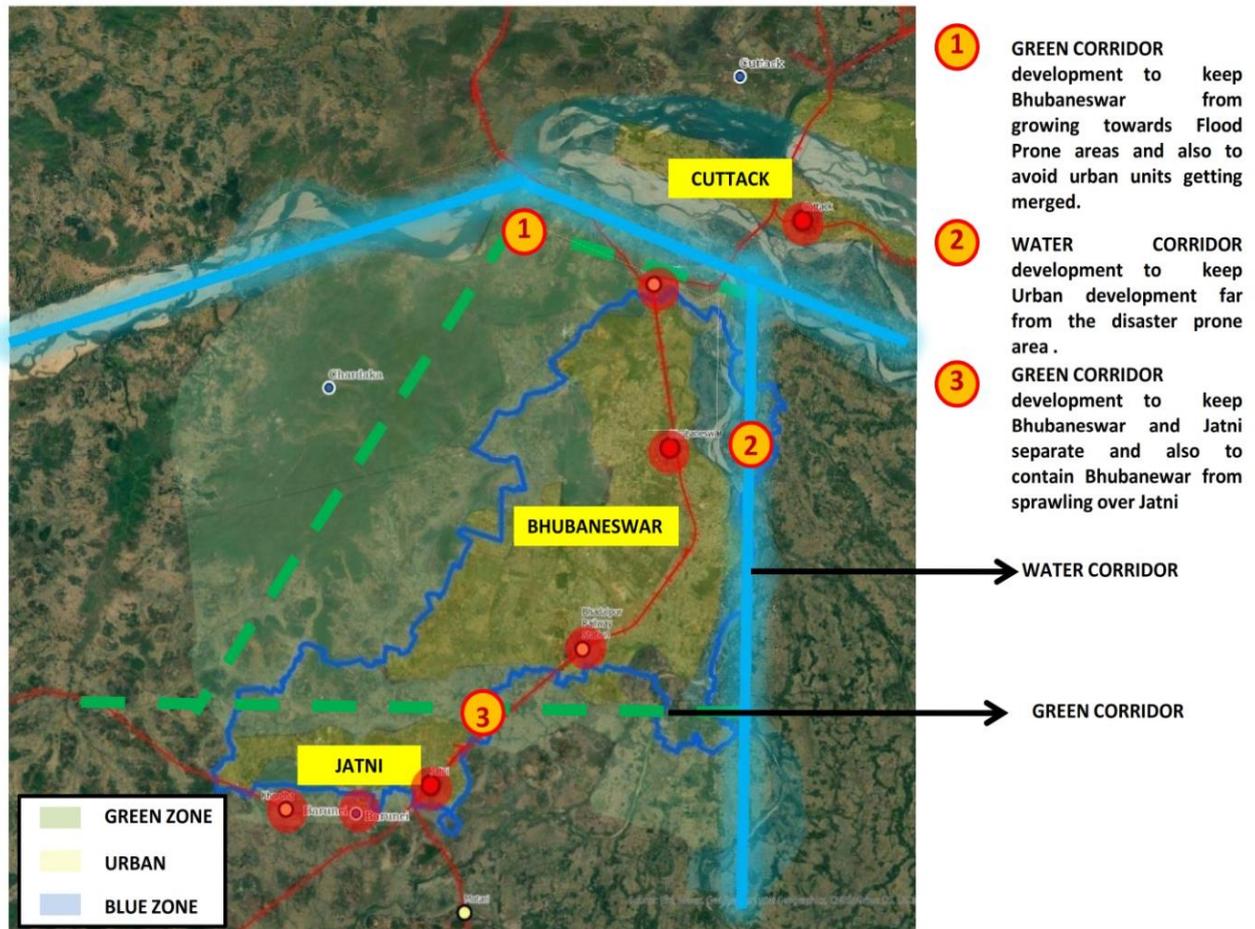
Project 2:

Protecting and securing the development on flood-prone areas through proposing the water corridor on the eastern side of Bhubaneswar along the banks of Daya River.

Project 3:

Developing a Green Corridor between Bhubaneswar and Jatni to manage the sprawl of the urban centers into the potential agricultural land is avoided.

To accommodate the proposed projects, zoning has been done as shown below.



Demarcation of Green & Blue Zones and Blue & Green corridors

Green Corridors: In the above figure Green and Blue corridors are been developed by connecting the existing forest cover and agricultural land i.e. Chandaka Sanctuary and proposed green belt between Bhubaneswar - Jatni and Bhubaneswar- Cuttack to stop the urban sprawl, by developing a grid of green corridors. These corridors are agricultural areas i.e. Food belts and no other land use will be permitted in these areas. A continuous network of green corridors will enrich the living spaces. (Chandaka sanctuary and agricultural areas, will be separated and grids of different hierarchies are to be developed)

Blue Corridors: Rivers and their tributaries are already connected. Here, Flood prone zones will be demarcated at a distance from the river as per the data obtained of Flood Inundation from the Irrigation dept. of Orissa and only recreational activities will be permitted in those Blue zones as indicated in the figure.

Regulation for Land Use Zoning in Flood-Prone Areas:

- Low-lying areas should be reserved for parks and other low-impact human activities,
- Wherever unavoidable, buildings in low lying areas should be constructed on stilts above the High Flood Level (HFL)/ Full Tank Level (FTL),
- For chronic flooding spots, alternate locations may be explored for accommodating people staying there
- Buildings should be constructed on stilts after taking into account the stability of slopes, and
- Storm water drainage systems for coastal areas have to be designed taking into account the tidal variations.

- Regulation for Land Use Zoning – Flood Prone Areas
- No building activity shall be allowed in the bed of water bodies like river, lake, pond or nallah/ storm water drain, etc.,

Preventive Measures

- Pre-Monsoon Desilting and removal of sediments
- Developing Storm water Drainage system
- Infrastructure Check: Airport, Roads, Bridges, Drains
- Checking capacity of water bodies
- Marking of levels and local benchmarks Warning dissemination
- Evacuation Plan and safe shelters identification
- Food and water supply

Phasing, Financing, and Implementation of Proposals

The above proposals are to be developed within a 7-year framework i.e. at the second stage of Metropolis planning.

Financing for Water Corridors will be provided under Department of Water Resources, also assistance can be availed from River basin management program and other PPP Models.

For Green corridors Department of Agricultural will be responsible for providing finance like BALARAM Scheme which assists farmers for loans and subsidies can encourage agriculture in the area. Apart from it Pradhan Mantri Fasal Bima Yojana (PMFBY), Pradhan Mantri Krishi Sinchai Yojana (PMKSY), Rainfed Area Development Programme (RADP), assistance from some central government schemes can be availed and PPP Models can be implemented.

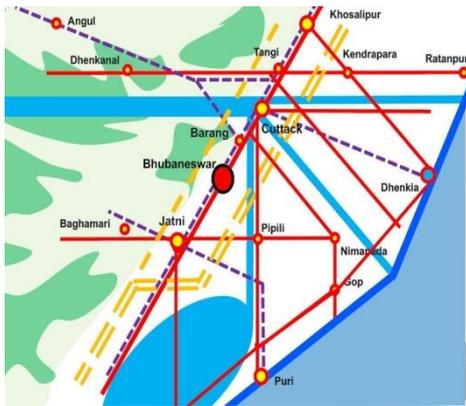
Implementation of both policy interventions will be in collaboration with the Metropolis Development Authority and Local Authority, in case of conflicts Metropolis Development Authority will be overruling the Development Plans of different areas.

TRANSPORT

Transport network provides impetus to the economy of an area. Apart from the increasing easy accessibility to places and fast movement, roads and railways indirectly helps increasing the commercial value of land as well as strengthen livelihood opportunities. Studies have showed that with the saturation of housing stock in Bhubaneswar, commute from nearby areas like Cuttack and Puri has imposed immense pressure on existing transport network and there is urgent need of high speed and last mile connectivity. This further justifies need of immediate development of transport network in Bhubaneswar Metropolitan Region area. The North – South connectivity is going to be key for the Bhubaneswar Metropolitan area, to boost the development of the peripheral area.

Key Feature: To promote Transit oriented urban form that promotes active, connected, and sustainable mobility choices; extended Metropolitan Mass transit Connectivity between Brahmapur to Bhadrak has been identified as TOD zone.

- Incremental road integration will increase Industrial activities.
- Low Carbon Emission



Identified Issues

The key issues identified for the development of the transport are

A. Connected Urban Nuclei

- Most of the urban nuclei are dependent on the local/private bus systems for commute, increasing the travel time to Bhubaneswar to more than two hours.
- Integrated fast transit should be proposed.

B. Connected Economic Activities

- All economic activities are concentrated in and around Bhubaneswar making the region unicentric and dependent.
- Another spine/corridor connecting urban centres with proposed substantial economic activity should be proposed.

C. Ineffective use of existing rail

- Existing rail spanning north-south is usually operates passenger trains that run at speeds of around 25- 30 km/hr.
- Fast speed commuter rail should be made available for existing and new proposed tracks.

D. Need for Airport and Port Expansion

- The current airport has already reached a capacity of about 9 million passenger per year and may reach about 15 -18 million till 2050. There is no space for expansion of runways.

Land for another airport should be reserved, at a suitable location.



Sector Quantified Solutions

A. Connecting Metropolitan Areas through commuter rails and TODs

- Strengthening the current available rail network with higher speed and better rolling stock for faster commute.
- Propose New Stations between Jatni and Cuttack.
- Key Stakeholder: **East Coast Railways**

B. Highway facilitating economic growth and spread

- Creating an Economic growth corridor from Puri and expansion of Saharabedi working as a transit ready highway providing access to Industrial development and connectivity.
- Key Stakeholder: **NHAI**

C. Constructing additional airport for light freight

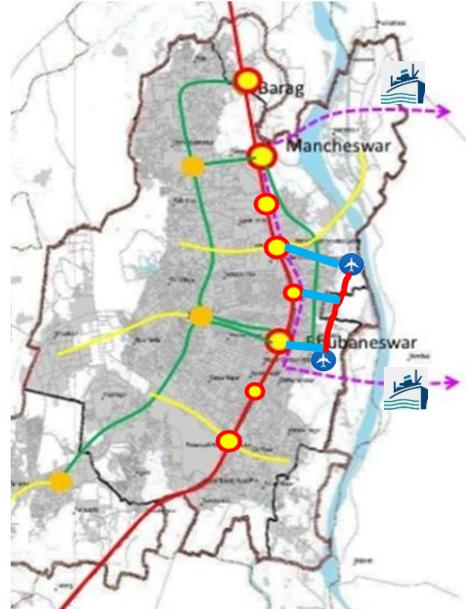
- The proposed economic growth corridor will promote increase in exports and international air traffic. This can be catered to by constructing a new airport at the end of the Economic growth highway.
- The secondary airport can be a dedicated freight airport, thus reducing the current load on the existing airport.
- Key Stakeholder: **Airport Authority of India**

Description of the Plan

A tied system of transport working seamlessly for local and international economic efficiency and to resolve housing demand. The objective is to create a homogenous solution for efficient transport system for the Bhubaneswar Metropolitan Region. The recommendations proposed are made based on (i) integration of urban nuclei and centralities by various transport modes; and (ii) enhancing housing, economic growth centres and social amenities. The proposals have been made to achieve the following: (i) improving regional connectivity; (ii) sustainable and integrated development; (iii) providing rapid and efficient transport; (iv) facilitating improved trade and international relations.

Proposals

1. **Improving and expanding Commuter Rail and its frequency:** This will ensure proper reach of travel infrastructure with feeder system integration along with considerable reduced travel time.
2. **Economic Growth Highway:** Linkage of coastal area will function as a major economic boon, and in the future will provide for more jobs, export and mainly decentralise the economic activities. The highway will be transit ready.
3. **Dedicated freight airport:** Will facilitate increase in manufacturing and jobs. The current airport will not have capacity for this thus, a dedicated freight airport will show increased returns.



	Project 1	Project 2	Project 3
Benefits	Increase in labour market, job accessibility, Sets the employment employee demand virtuous cycle	Increases logistic capacity, Facilitates the tendency of quaternary sector to coalesce	Triples the logistic capacity due to separate facilities, Facilitates exports, Streamlined operation.
Scope	180km Brown field, 60Km Green field	70 Km Green field Transit ready roads	Green field Single runway airport
Feasibility			
Time	3-5 Years/phase	2-3 Years	3-5 Years
Finance	Green field - \$ 5M/Km Brown field- \$ 25 M/Km	\$ 5 M per Km for on grade and \$15 M per Km for elevated	\$200 M
Governance & Administration approvals	A union list item Ministry of Railways, State government, Metropolitan transport authority (MTA), MoEFCC	A Concurrent list item MoRTH, NHAI, MoEFCC, State government, Metropolitan transport authority	A union list item IATA, AAI, MoEFCC, Ministry of civil aviation, state government, MTA
Spin-off effects	Increase in quality of life, Land Value, Reduced congestion & accidents.	Increase in employment and land value	Increase in production of high value added goods

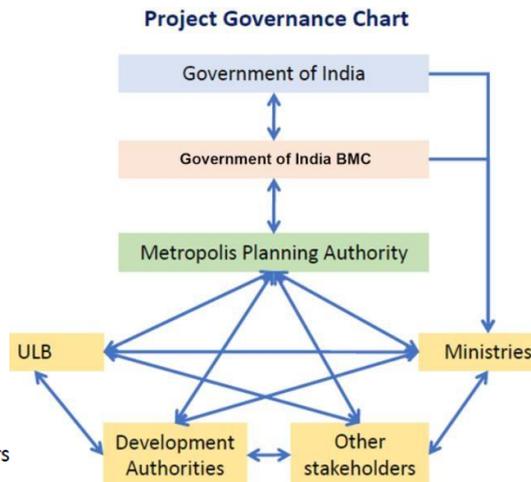
	Project 1	Project 2	Project 3
Engineering	Transport, Hydrology, Geology, Environment	Transport, Hydrology, Geology, Environment	Transport, Hydrology, Geomorphology, Environment
Social approval	Local Residents, Land acquisition, Relocation	Land acquisition, Relocation, Pollution	Land Acquisition, Quality of life
Implementation agency	Central Government	Central and state government	Central government
Phases	2	1	1
Finance mechanisms	Equity sharing, FDI, PPP	Direct Industrial Finance, Town Planning Schemes	Through Current Policy: Airport Privatisation
Finance returns	From user fee, decreased economic and social cost of Congestion & accidents	From the Increased land values and user fee	From the Operations and user fee.

Project development and implementation

Given the multiple agencies and stakeholders involved, an umbrella organization for the metropolitan region should be constituted with all other urban agencies being equal stakeholders.

Implementation Strategy

Prioritization of projects	Short, Medium, Long Term
Feasibility study	Costing, Cost Benefit analysis, EIA, Social impact and rehabilitation
Phasing	
Approval	Centre/ state and other authorities
Funding	Equity sharing, PPP, FDI, Bonds.
Implementation	Governing bodies and all stakeholders

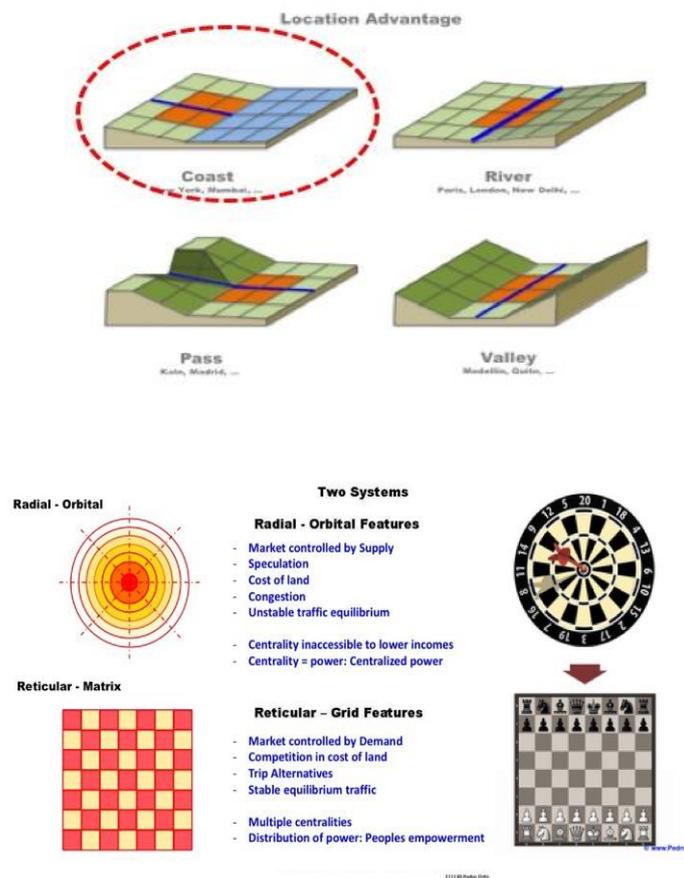


HOUSING

Population and Housing - The previous determinations and locations of land use and infrastructure has been addressed with the housing policy in mind. They are the derivative policies of an integrated housing policy.

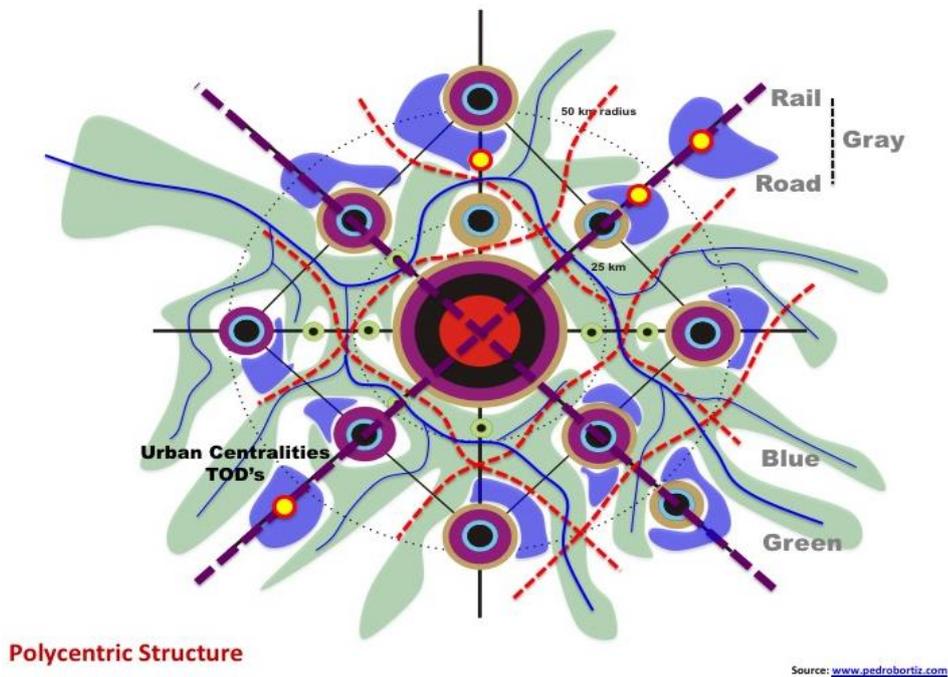
i. Sustainable location strategy

Bhubaneswar is located on a sea plain, separated from the Deccan Plateau by a ridge of Ghats that run along the Indian east coast. There are many examples of similar topographies for example Mega-York or Mumbai. This type of topography is not too detrimental to thrive in. This geographic position provides plenty of water from the mountain ranges and a very structured topography of parallel rivers running perpendicular to the sea. It gives the metropolis a very clear structure of a reticular pattern. Bhubaneswar metropolis belongs to the seacoast typology. The two directionalities, intrinsic to the metropolitan DNA, must be the structuring principle of Bhubaneswar metropolis, away from the radial-orbital model still most implemented.



The radial orbital model is congestive as it pushes activities and traffic to the center. This congestion is a strong economic burden that in Mumbai can amount to as much as 25% of the metropolitan GDP. The other disadvantages of the model include land exclusion since it makes the center a scarce resource; it condemns the market to be controlled by supply instead of demand; and excludes the lower incomes to a distant periphery difficult to provide with the social services they lawfully need and deserve. The orbital model is inefficient, inequitable, and unsustainable. Further, the orbital model, in political terms, prioritizes the center against the interests of the equilibrium of the whole and in detrimental of the periphery. The decision for the state government of Bhubaneswar here

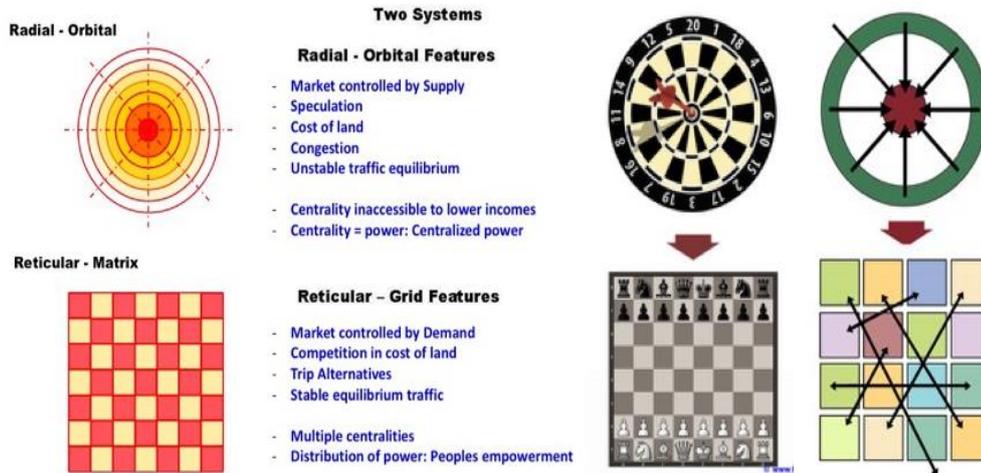
is whether their priority is Bhubaneswar Corporation against the benefits of the Metropolis of Bhubaneswar and the whole of the state.



Polycentric Structure

The reticular polycentric model, public transport and urban centralities based, for housing social facilities and productive activities location.

Metropolitan professionals globally have moved to a reticular model two decades ago. The reticular model provides homogenous accessibility, breaks down congestion since, for any trip the multiple routes dissolve in a natural way (stable-equilibrium phenomenon) congestive demand, land owners do not control the market as multiple alternative locations are available and the market is finally controlled by demand and not supply. This model also creates and fosters competitive poly-centricity. Social groups can integrate in the interstices of the structure as close as possible to the social facilities they most need – this model is the most effective, equitable and sustainable model, as proven by the success of the Ruhr valley and the key drawback of Bhubaneswar’s orbital model.



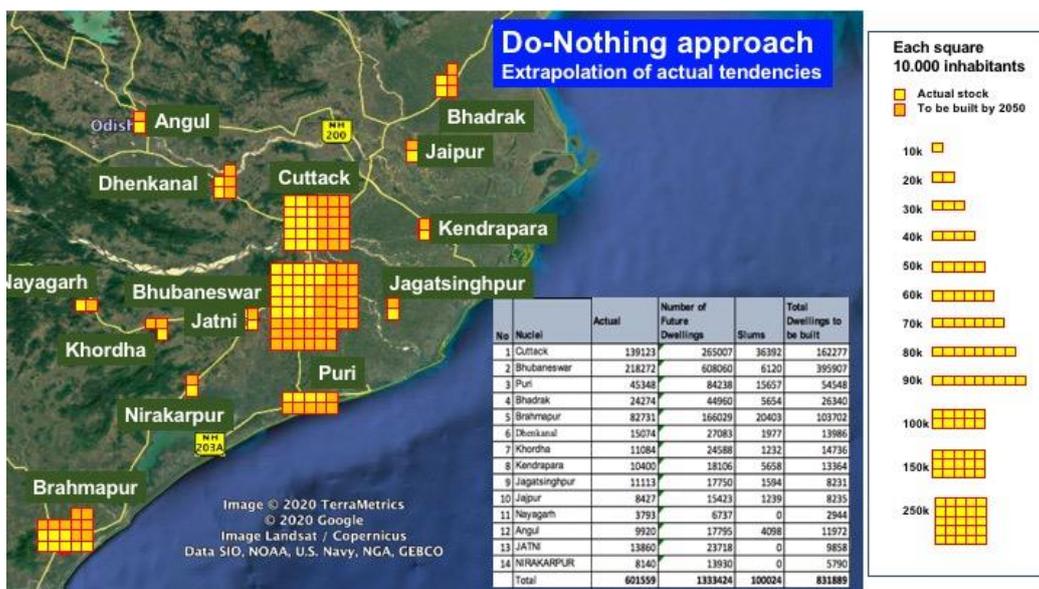
Efficiency comparative between Radial and reticular systems: From Mono-centricity to Polycentricity. From Darts to Chess

ii. Bhubaneswar ‘do-nothing’ approach

Bhubaneswar and Cuttack are growing very fast. The lack of an efficient metropolitan transport system forces population to concentrate in these two cities. The result is unavailable serviced land and uncontrolled slum expansion of up to 7% of the dwelling production every year. The absence of an adequate housing policy both in land production and demand finance is the one that is increasing slum expansion and increasing the problems of Bhubaneswar for the future that may well become unmanageable.

Serviced Land provision

If we apply the population expansion figures coupled with the reduction of family size, we have the prospect of providing housing from an actual stock of 600.000 dwellings to a future need of 133.000 plus an actual deficit of 100.000 slums (growing at 7% annual, that is doubling every 10 years) we need to provide serviced land for 830.000 dwellings in the next 30 years or 28.000 every year.



As we can see by the extrapolation of actual location tendencies the do-nothing approach would continue concentrating housing in the actual locations. Locations that have already proven to be unable to respond to the needs of the population. Bhubaneswar with little more than 200.000 dwellings now, cannot, in 30 years more than triple its size. It needs to build almost 400.000 new dwellings, at a rate of 13.000 per year. Cuttack, with 140.000 dwellings now, would have to build 160.000, more than doubling in size.

Neither Bhubaneswar nor Cuttack, can respond to this challenge. The housing market tries to produce for those that can pay. Many of these families in need cannot afford the housing prices the free market can provide. But they must live somewhere, and they become the cannon fodder of slum demand. That is why slums are growing at a 7% annual rate in Bhubaneswar. There is a need for a policy of transport accessibility to larger and more affordable land locations, as well as land provision at prices adequate to the capacity of the demand. This later requires a housing policy able to complement demand when this one is not able to confront market prices as they are in absence of that housing policy.

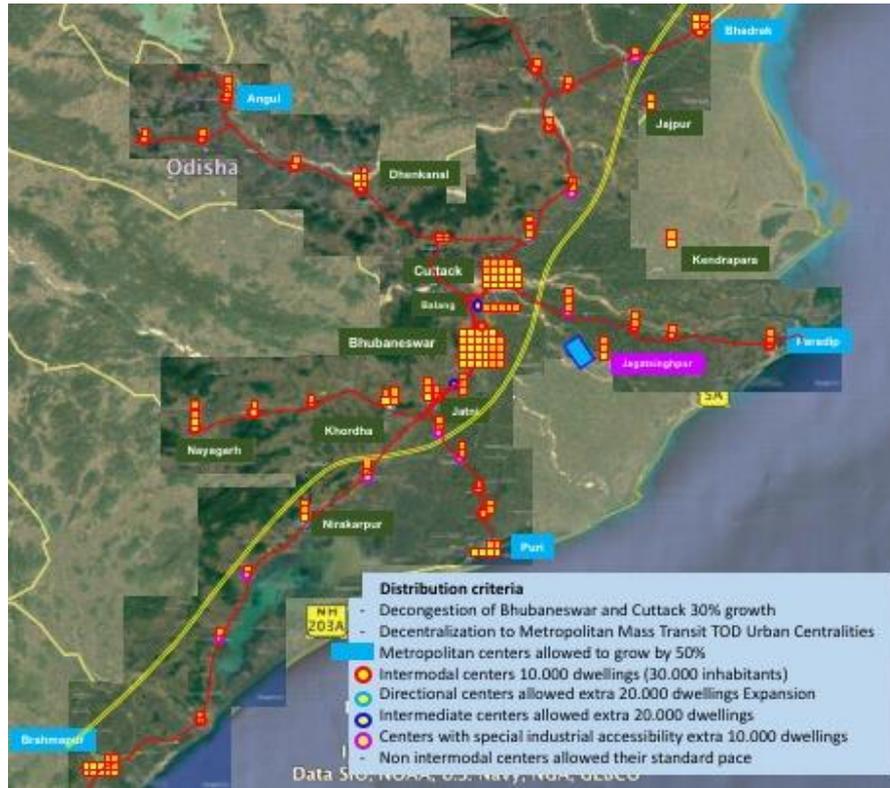
The actual market, with just anecdotal interventions from public policy, is unable to provide for these needs. The problem is two sided:

- As the metropolitan **transport system** is unable to move people around in the metropolis in a commuter daily basis, unlike in developed metropolises, everyone must be as close as possible to jobs and sources of income. This forces a pattern of concentration and congestion, and a fight for the available scarce land for housing that only the wealthy can win.
- Consequently, as the **housing policy** goes, those that cannot afford a decent house in a decent serviced land have to insert themselves in the informal market, uncontrolled developments, and 'indecent' slum dwellings.

iii. The alternative 'Do-something' approach

Serviced land provision

The way to reduce the cost of land is to increase access to transport across the metropolis in a way as to increase the potential location of new housing within a commuter reach from the job markets. In developed metropolises across the world the commuting system is the rail based one. Around the intermodal train stations housing is provided within a 30-to-40-minute daily journey to work.



Bhubaneswar has an excellent rail track layout and 38 alternative locations to Bhubaneswar and Cuttack are available. Housing serviced land can be made available at an affordable cost at these 38 alternative locations. Housing supply and demand need to be allocated in these alternative locations to reduce pressure on Bhubaneswar and Cuttack, avoid speculation and allow for a more balanced housing provision.

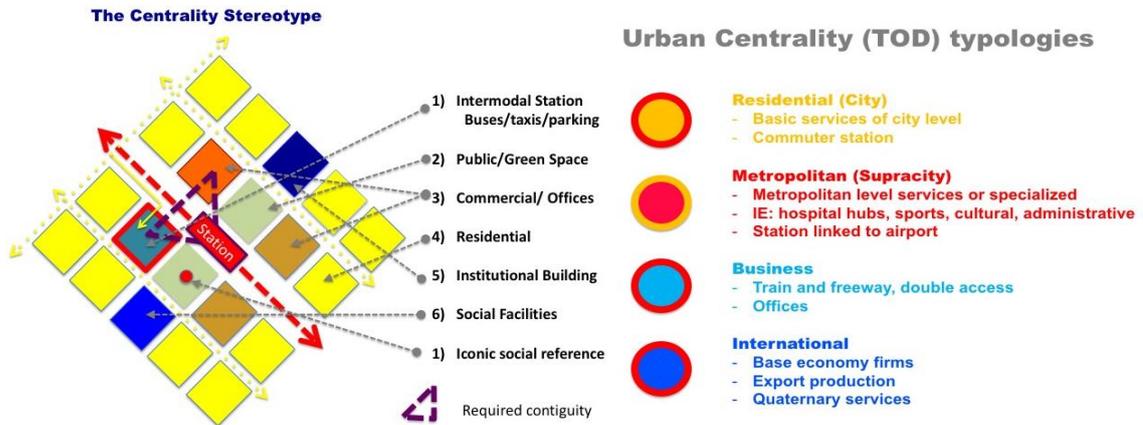
The housing distribution criteria is to be:

- Decongestion of Bhubaneswar and Cuttack from 30% expected growth
- Decentralization to Metropolitan Mass Transit TOD Urban Centralities

The tentative distribution is as follows:

- Metropolitan centers allowed to grow by 50%: **Angul, Bhadrak, Paradip, Puri, and Brahamapur**
- Intermodal centers with train accessibility 10,000 dwellings (30,000 inhabitants): **the 38 shown**
- Directional centers allowed extra 20,000 dwellings expansion: **Dhenkanal, Jaipur, Kendrapara, Nirakhapar, Kohorda and Nayagarth**
- Intermediate centers allowed extra 20,000 dwellings: **Jutni and Balang**
- Centers with special industrial accessibility extra 10,000 dwellings: **Jaganaisphar.**
- Non-intermodal centers, he ones without train accessibility, allowed their standard pace of growth

These Urban Centralities cannot be left to be developed by the private sector. The complexity of development, the social externalities, the cost-benefits, and opportunity costs of the required investment cannot be addressed by the private sector. However, the private sector would be extremely grateful to have the opportunity to have serviced-land available to build the housing and promote much better than the public sector.



Some Centrality typologies with significant items, and the items to be included in each centrality

Urban Centralities must have 7 elements although not necessarily in the same proportion. Each element will have its volume adapted to the character and needs of that centrality. A Health Centrality, for instance will have a much larger proportion of Social Facilities than any other like a Business one, where offices will be predominant.



Draft Proposal for the Intermodal Station Centrality at Cuttack

The Transport Team has provided a tentative proposal for Cuttack Urban Centrality. Further design and detail determinations to be pursued for this centrality as for all the others.

Demand structuring and finance

To provide serviced land is not enough for a population that does not have the income capacity to access to the free market prices. Demand needs to be structured to quantify both the number of families and their financial capacity and develop policies to breach that gap with the market in each category of the structured demand. The demand is to be structured in 4 categories following the Madrid's 1996 Metro-Matrix approach now assumed by numerous organizations. The four categories are:

- **Real Demand:** The one that has the means to solve its needs with sufficient finance capacity.
Policy Approach: In this case the public sector just needs to regulate the market to avoid frauds and ensure the required housing quality and compliance to the bylaws and regulations.
- **Potential demand:** The one that is 'quite' in Real Demand's situation but requires some help from external sources to reach the small gap that prevents it from becoming Real Demand. This gap might be in the range of 10%
Policy Approach: Most often it is a policy of financial backing on any of the 3 aspects of capital investment (return, liquidity, and risk) to breach the gap. This is the focus on Housing Policy Plans and Agreements with private financial institutions: Interest rates, Mortgage time spans, Risk Warrants, etc.
- **Insufficient Demand:** The one that is far from being able to reach the level of Real Demand. It requires decisive action from the Administration. This gap might be in the range of 50%.
Policy Approach: Decisive action cannot be reached solely through financial means as the burden to the public budget will be very high. Most often the policy approach is done by serviced land provision. The cost of land might add up to 50% of the total cost of the housing. If that land may be provided free for this type of demand the gap would be bridged. Policy is thus focused on the development/acquisition of this land at minimum cost for the Administration. Most of them targeting the catchment of plus-value produced by public intervention of the land Supply to the Real demand. The plus-values of those developments can provide for a legal secession of part of that land for public policy purposes.

Demand Structuring

1) Real demand:

They can buy their own. No help required.

Just setting up right rules to regulate right the financial and development market:

ie: Land market (tenure warranty)
Building Standards (security of buyer),
Standard contract: Legal rights and duties,
Financial market regulations
Speed on the judiciary system

2) Potential demand

Can reach demand with a little help

ie: Cross indirect subsidies (Land production value % of development)
Financial complement (bank regulations)
Tax exemptions

3) Insolvent demand

Must be heavily helped:

ie: Free land
Direct subsidies

4) Unable demand:

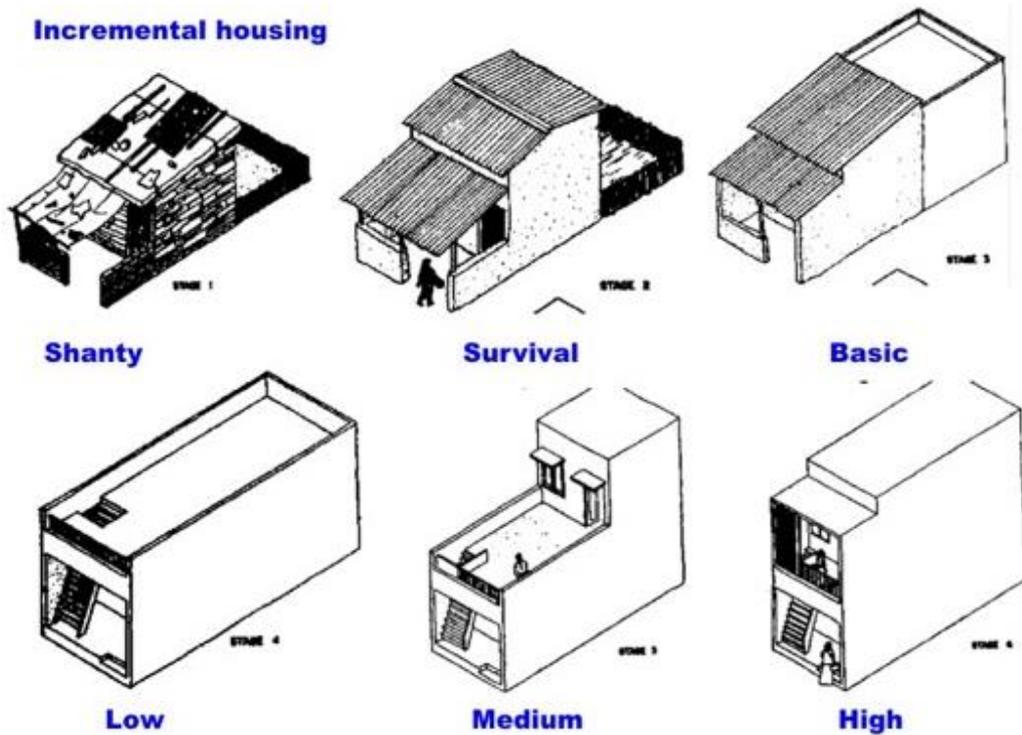
Social Housing

ie: Public construction
Payment related to capacity, not to costs
Rent instead of ownership
Special typologies.

Policies to be implement by the Public Administration to respond to the needs of the different types of Demand

- **Inexistent Demand:** This is the Demand that is incapable of solving its needs in the housing market. When, in some 2.000 USD/Cap annual GDP countries some of its population are in the 700 USD range, less than 2 dollars per day, their capacity to provide for long term investments as housing is inexistent. No financial institution will grant any type of help. Food and survival are the main targets of this type of income range. The Administration must provide for most of the cost of housing. The gap might be in the range of 80%.
Policy Approach: Apart the provision of free serviced land the Administration needs to think of the house construction for almost free. Often the approach is an 'incremental' one. The basic water/power core of the house is provided in a standardized prefabricated manner in the plot and materials are provided in special (controlled) conditions for self-construction. The size and adequacy of the dwelling grows with the needs and the capacity of the family unit.

Incremental housing



Incremental Dwelling Strategy: evolution on dwelling quality within the standard plot

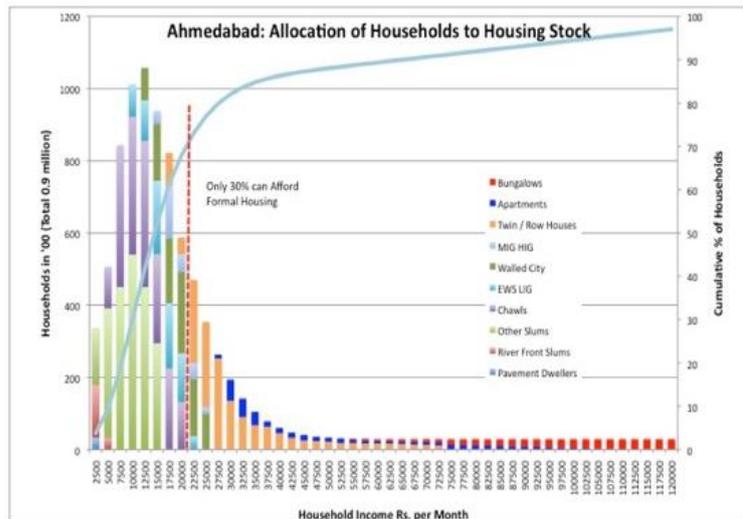
The funds required for implementation of these targeted policies are within the range of public budget even in the poorer countries. To give a couple of examples, in Chad this policy would amount to less than 9% of the national oil revenue, in Bucaramanga, Colombia, it would amount to 20% of the local administration budget. These are to be national policies and that 20% needs to be provided by national transfers that would amount to 10% of the National Budget.

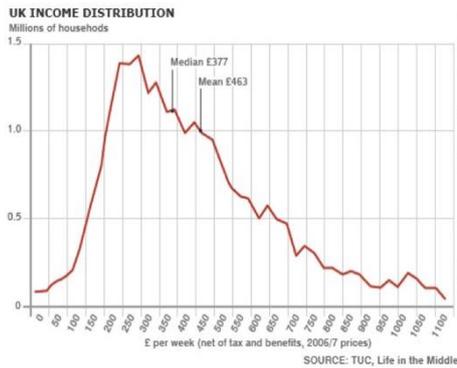
a. Demand curve and policy groups

Ahmedabad has done an excellent work on approaching the analysis of the dwelling stock. Their Housing Stock Curve is levelled at the highest international standards.

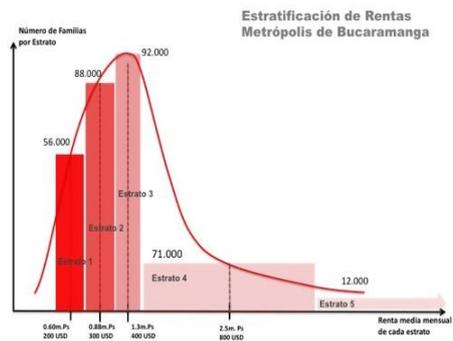
This curve follows the income curve of nations and of the particular place

as the value of the dwelling most of the time reflects a proportion of the income of the owner. For that purpose, we present two income curves, England and Bucaramanga, to discuss the differences.





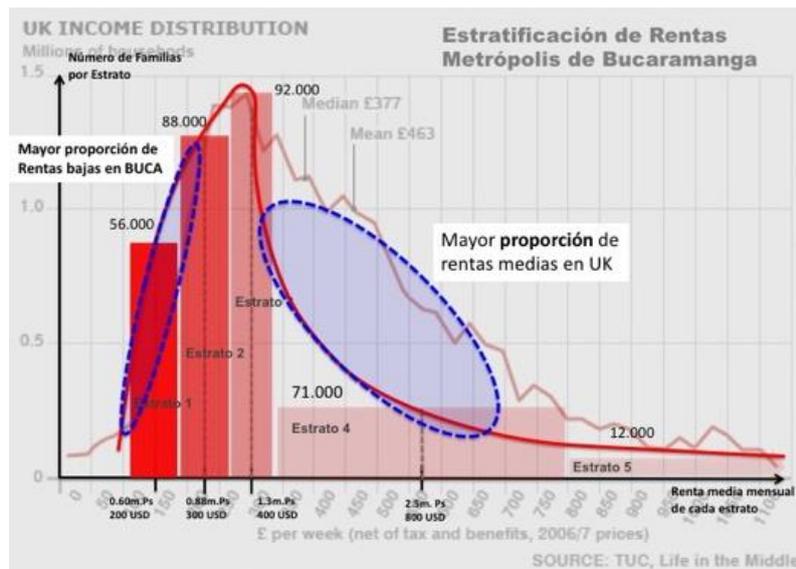
United Kingdom National Income Curve



Colombia/Bucaramanga National Income Curve

Apart from the absolute value of incomes, that is directly related to the wealth of the nation and the national GDP, we see structural differences between the two curves. That reflects deeper differences in equity and efficiency of the social structure. The main differences we want to stress is a sharp reduction of incomes in Colombia compared to a slower slope of progressive reduction in England for those middle incomes.

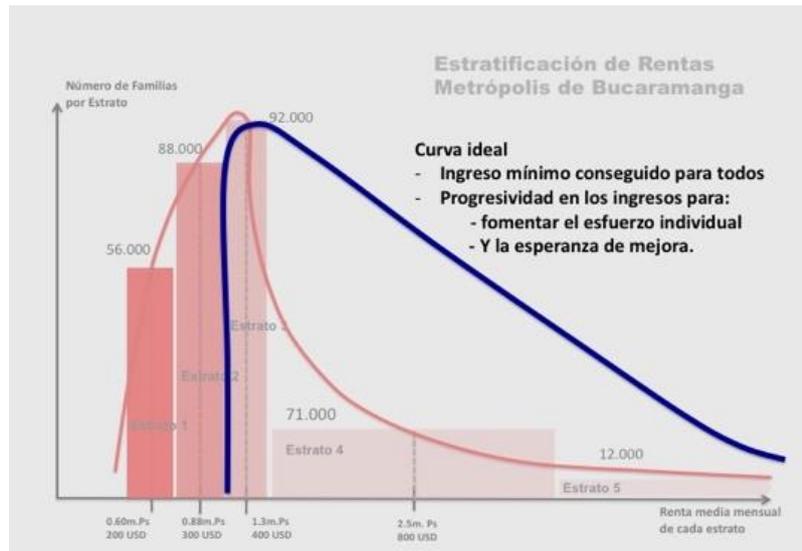
This proves radical differences in social and economic aspects. The absence of a strong middle class has implications on meritocracy and the capacity of low-income families to improve by



The two structural 'gaps' of National Income Curves: The very-poor and the middle-class

hard work and personal enterprise. Lack of a productive/skilled middle class also has deep implications on the productive system and the efficiency and wealth production of the economic sector of these countries. The second aspect is the slope at the beginning of the curve, on the left. A sharp growth with a steep slope proves the lack of 'very poor'. Incomes reach very rapidly the minimum decent-survival high point maximum. On the contrary the gentler slope proves the existence of many families that do not reach a minimum standard. This has more of social equity implications than economic ones. Obviously, even in a free market meritocratic system of values (social resources, collective intelligence), the social fabric needs to provide for the minimum needs and requirements of all its members. The 'most in need' should

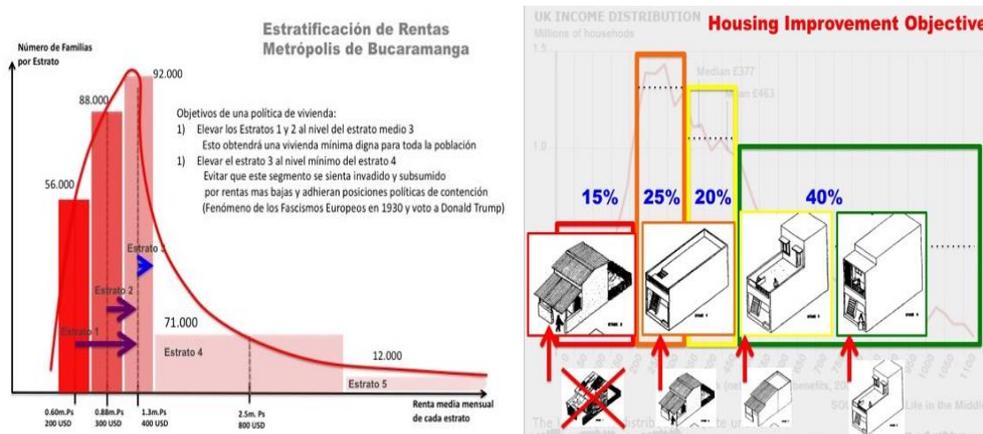
not exist. Every family should be able to reach the minimum decent-standard. The English income curve, far from being perfect, is far more equitable and efficient than the Colombian one. As a matter of fact, the 'ideal curve' would be the one where no poor exist, and the slope of the middle-class



The 'ideal' national income curve: No Poor and Continuous Middle-Class

incomes allows for a progressive improvement for anyone that targets so in its income life ambitions.

In terms of a housing policy, the objectives would not only be to pull out the very-poor from unacceptable dwelling quality (slums) but to improve the conditions of the three structured demand groups that require administrative attention (Potential, Insufficient and Inexistent demands). The housing policy needs to target all the demands that need administrative backing to solve their needs.



Progressive/Integrated and Incremental approaches to a Housing Policy Plan

b. Bhubaneswar

The Income Curve, the demand structuring approach and the budgetary cost of the housing strategy for the Bhubaneswar metropolitan area were derived.

DEMAND STRUCTURING : Income Distribution



Bhubaneswar Income Curve, Demand typology segments and targeted Policy strategies

The inexistent demand was the number of families that are forced to find refuge in slum dwellings every year. This is very high at 38.7%. Real demand corresponds to the income segment that can afford to buy a house within the actual supply by comparing it with the cost of housing in Bhubaneswar – this is 17.20%. The difficulty lies in the border line between the potential and the Insufficient Demand.

FINANCIAL STRATEGIES

FINANCIAL ASSISTANCE : 2050

Total Projected Population of Metropolis by 2050 : 46,66,986
Total Dwelling Units to be built by 2050 : 8,92,794

Demand Type	% of Total Demand	No of Households	Cost/ Dwelling Unit INR	Cost/ Dwelling Unit USD	% Financial Aid	Total Funds Needed by 2050 (Cr)	Total Funds Needed by 2050 (Mil USD)
Inexistent	38.70%	345511	600,000	8400	100%	90730	2902
Insufficient	24.85%	221859	1,000,000	14000	50%	11093	1553
Potential	19.25%	171863	1,500,000	21000	10%	2578	361
Real	17.20%	153561	3,000,000	42000	0%	0	0
	100%	8,92,794				34401.5 Cr	\$ 4816 Million

Annual : 1146 Cr (\$ 160.5 Million)

ORISSA STATE BUDGET :2020-21

- Annual budget allotted for Water supply, Sanitation, Housing and UD : 11,337 Cr (\$ 1.54 Billion)
- 518 Cr has been allocated for PMAY urban : housing for urban poor (slums and LIG)

- Odisha State has to spend 160 million USD every year to address the housing policy within the state metropolis,
- It is 10% of the State budget allotted for Water supply, Sanitation, Housing and UD
- State has to be responsible for holistic housing and infrastructure development of the metropolitan Area

FINANCIAL PROPOSALS:

- Housing Regulations
- Public- Private Partnership (PPP)
- Cross- Subsidy Projects
- Commercially Viable Projects
- Low Interest Loans
- Credit Linked Subsidies
- Market Borrowings
- Banks & Financial Institutions
- Municipal Bonds
- Credit rating & warranties
- Property & Vacant Land Tax
- Building License Fees
- Encroachment Fees
- Parking Fees
- Betterment Charges

Financial requirements and Feasibility approach to a Housing Plan in Bhubaneswar

The financial requirements to produce the 893,000 housing units to be built in the next 30 years were derived and assigned to the different segments of demand.

- 346,000 for Inexistent Demand.
- 222,000 for Insufficient Demand, and
- 172,000 for Potential Demand.

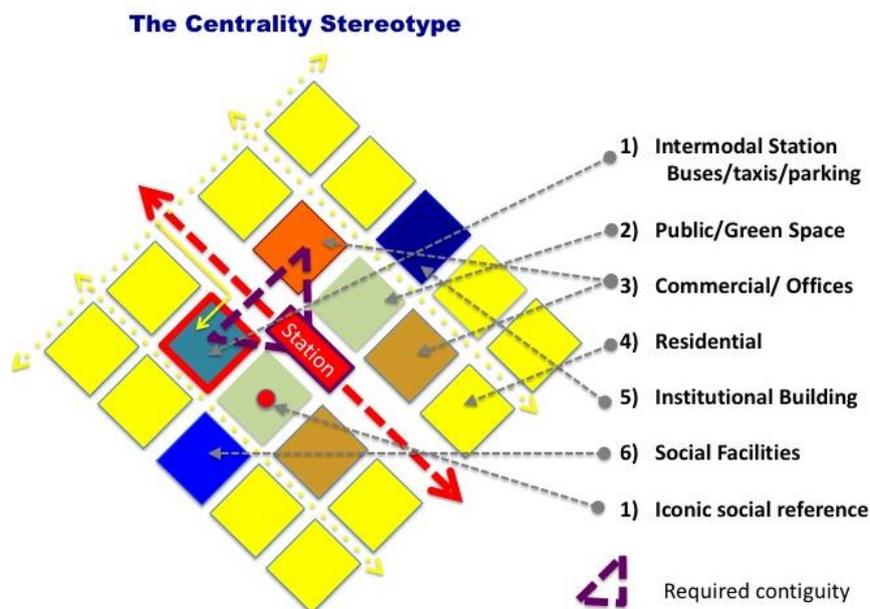
Total financial requirements in each group would be:

- 100% for Inexistent Demand with an amount of close to 3.000 million USD,
- 50% for Insufficient Demand with an amount of 1.500 million USD, and
- 10% for Potential Demand with an amount of 400 million USD

Providing housing for all in the metropolitan area over the next 30 years is estimated at 5 billion USD or 166 million USD annually. This appears to be well within the budgetary capacities of the state.

Social facilities

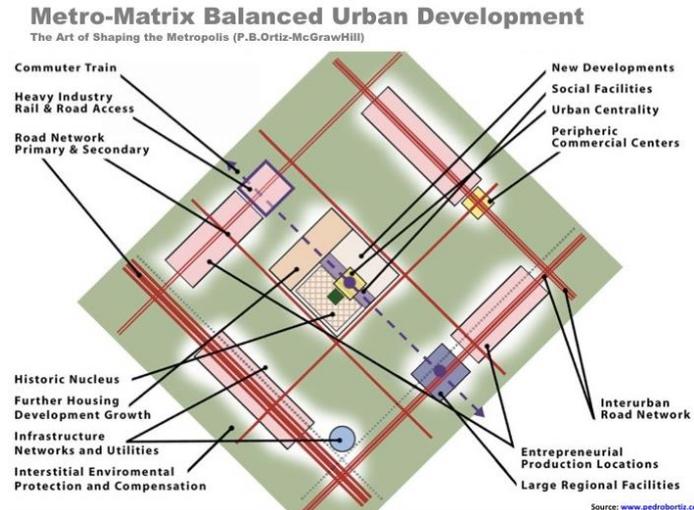
Social facilities are very diverse and can include typologies related to Health, Education, Culture, Special (Gender, Old, Young, etc), Leisure, Sports, Tangible Heritage, etc. - each with many sub-typologies that require specific Sector Plans, location strategy and available land at low cost for implementation. The location for Social Facilities has two conditioning factors:



- 1) Social Facilities must have the highest Mass Public Transport accessibility. In such way that they can be reached at the lowest cost by the maximum population. Especially for those that are in the lowest income brackets and need them most and can hardly afford an expensive access, both in transport and on fees.

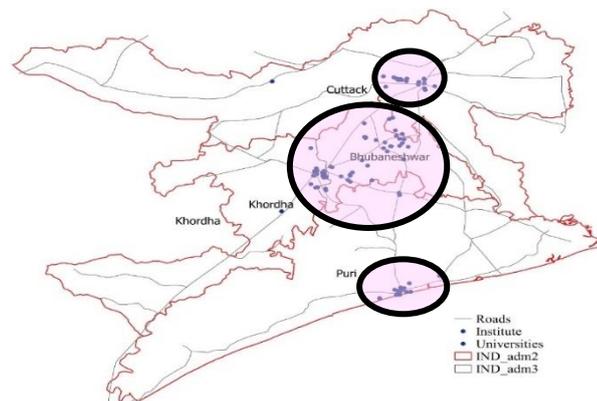
Urban Centralities Location: The best location in these cases is at the urban Centralities. It is a win-win strategy, as Social facilities reinforce these centralities and are serviced by mass public transport but likewise help to build up the demand for that transport reinforcing possible feasibility and cost benefit studies' results. That land can be obtained free even if it has a high value due to the accumulation of infrastructures of all kind in an Urban Centrality. One must account however that part of that value is due to the location of Social facilities that provide services that generate additional values around.

- 2) The land required is massive (IE: Stadiums, sports grounds, parks, large hospital complex or Universities, etc) then it is a misuse of the urban centrality land for that purpose. It can even reduce the best use of the accessibility if the Social facility has a temporary use (Stadiums).



Balanced Urban Development (BUD) Unit and the location of large Social Facilities of Metro/Regional dimension

Double accessibility Regional Nodes: large land requirements should be peripheral. However, accessibility is still essential. Thus, the right location is along the transport infrastructures. The crossings of those infrastructures, i.e., highways, double the accessibility and allows for dispersion of traffic at large events. That is why Arenas and Stadiums¹ are at those locations when they are relocated or built anew. If two modes



Location of higher educational institutes & universities

¹ Historic Stadiums where in peripheries that now have been engulfed within the urban fabric. The emotional connotations prevent the authorities to move them away to more rational locations. In the USA the failure of Historic Centres to keep activity as prompted the Authorities to relocate Stadiums Central in a desperate attempt to bring back activity

of transport cross, for instance highways and rail tracks, optimum accessibility can be achieved. That is why large Social facilities are best at those locations as shown in the 'Balanced Urban Development' BUD Unit.

Sector Situation – Educational Facilities

Bhubaneswar is a center for higher education in the Eastern Region with most institutes being located to the northeast of the city. Cuttack too has many higher education institutions and Puri has most of the institutes located at edges of the town. The Southwestern part of metropolitan region is comparatively poor in educational facilities.

Most of the educational institutions have developed along the major transportation links on account of good connectivity. The requirements for education facilities is as shown below.

	Professional Institute	Educational	General Educational Institute
Population in 2020	27,07,016		27,07,016
Existing in 2020	336		12
Required acc. URDPFI	9		21
Gap	More than Required		9
Population in 2050	46,66,984		46,66,984
Requirement	15		37

to those abandoned and semi derelict urban centralities. Neither of them are examples of well doing.

General Education Institutes

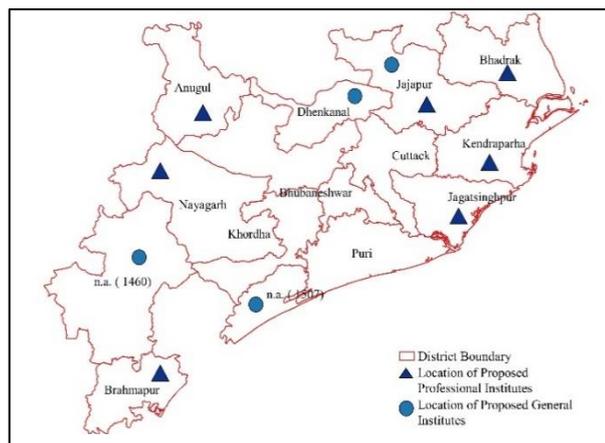
	Engineering	Medical	Other professional institute
Existing in 2020	105	31	200
Required acc. to guidelines	3	3	3
Gap	More than required	More than required	1
Total Required in 2050	5	5	5

Other Professional Institute include Architectural, Law, Business, Pharmacy, Paramedical etc. institutes.

Population in 2020 = 2707016

Population in 2050 = 4666984

Location based Strategies/Proposals The estimated numbers of education institutions as per the URDPFI Guidelines is as shown in the table above. It is recommended that education institutions be developed in the southwest and northwest areas of Bhubaneswar according to the population density. The adjoining map shows the location of professional as well as the general education institutes in the Bhubaneswar metropolitan region decided based on proposed transportation system.



Proposed Locations: Education

Sector Situation – Medical Facilities

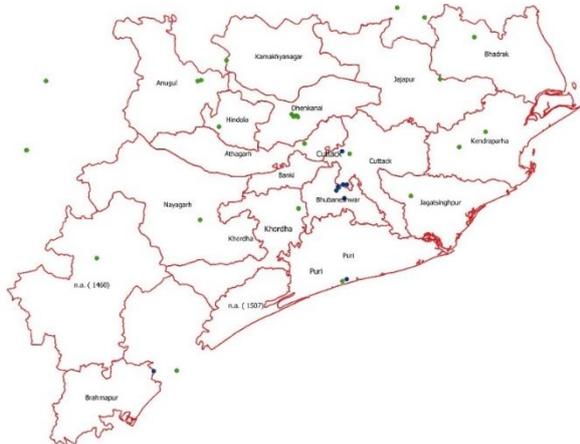
Most of the higher order medical facilities are in the Bhubaneswar metropolitan region while PHCs and CHCs are found across the state. The southwestern part of the state has very few facilities.

Medical Facilities Requirements

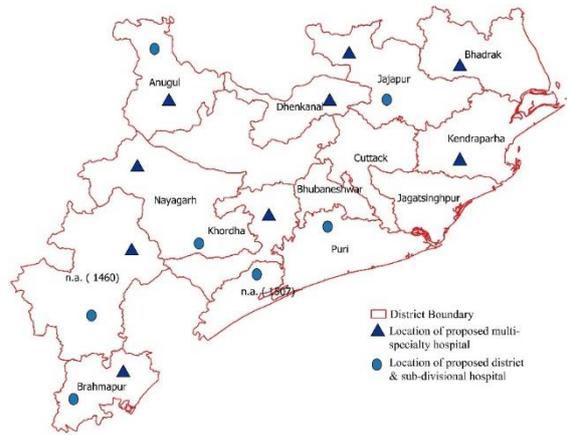
	Multi-specialty hospitals	District and Sub-Divisional hospitals
Population in 2020	27,07,016	27,07,016
Existing in 2020	8	23
Required acc. URDPFI	27	10
Gap	19	More than Required
Population in 2050	46,66,984	46,66,984
Requirement	46	18

Location based Strategies/Proposals

The estimated number of medical facilities according to URDPFI Guidelines is shown in the table above. While the number of district and sub-divisional medical facilities is as per the norms, there needs to be an increase in the number of multi-speciality hospitals. The distribution of medical facilities over the next 30 years across the Bhubaneswar metropolitan region is shown in the map. The proposed locations are based on transport network and population density.



Distribution of existing medical facilities

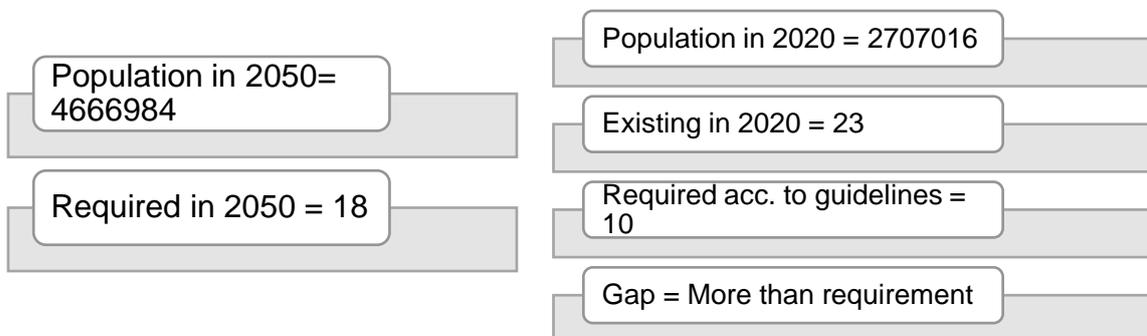


Distribution of proposed medical facilities

Sector Situation – Sports and Recreational Facilities

Bhubaneswar Metropolitan region has a national park and stadium and the southwest part of state has forestland cover. Following is the specification of national parks and stadium across the region:

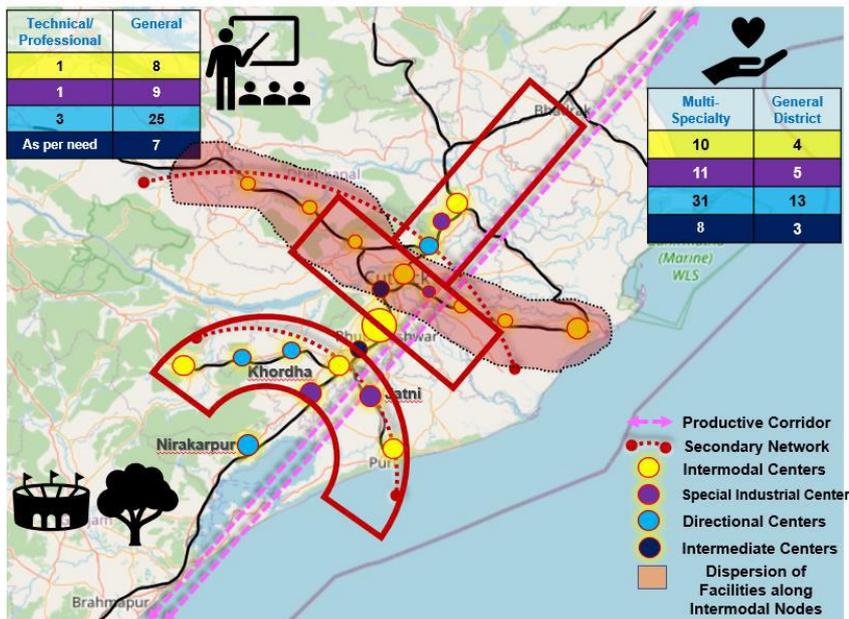
1. Barabati Stadium (Cuttack) - It is the largest and first stadium of Orissa. Capacity: 45,000- It is a regular venue for international cricket.
2. Kalinga Stadium - Capacity: 15,000 it is International stadium in (Bhubaneswar).
3. Creating sports hub form, can lead to traffic congestion on Bidyut marg.
4. Government of Bhubaneswar Department of Sports and Youth Services: Currently two are present. Organises activities that include Youth Welfare Programmes like Youth
5. Festival for empowerment and capacity building of youth.
6. There is other stadium in metropolitan region such as hockey stadium, badminton court, football practice, shooting stadium.



Bhubaneswar and Bhubaneswar Metropolis

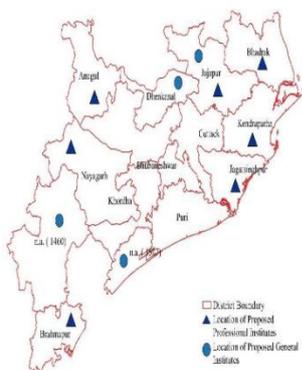
The limited time for the proposal made the workshop team concentrate on 3 typologies: Health, Higher Education, and large Sports infrastructures.

The previous described location strategies distributed Social facilities within the Urban Centralities defined in the intersection of Transport and Housing policy chapters, serving that way directly the population that would use daily these intermodal centres. Those Centralities have already been shown in the Transport and Housing sections.

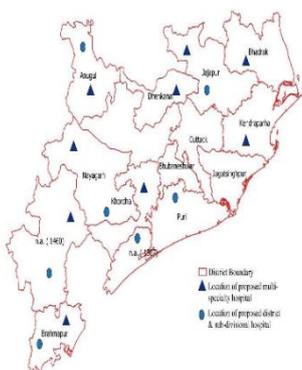


Integrated Social Facilities Proposal

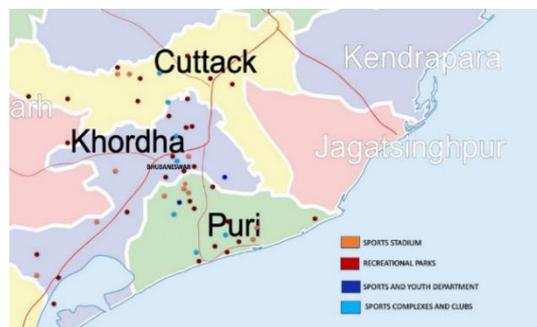
The larger facilities follow the metropolitan strategy of peri-urban and interstitial land uses. The team detected the metropolitan structure of the National Highway 'backbone' and the transversal 'ribs' from Angul to Paradip and from Nyagarth to Puri. They have diagrammatized it in an inverted T and C. Along those transport lines, both road and rail main services are located the larger Social Facilities following the general principles previously described.



Proposed locations for



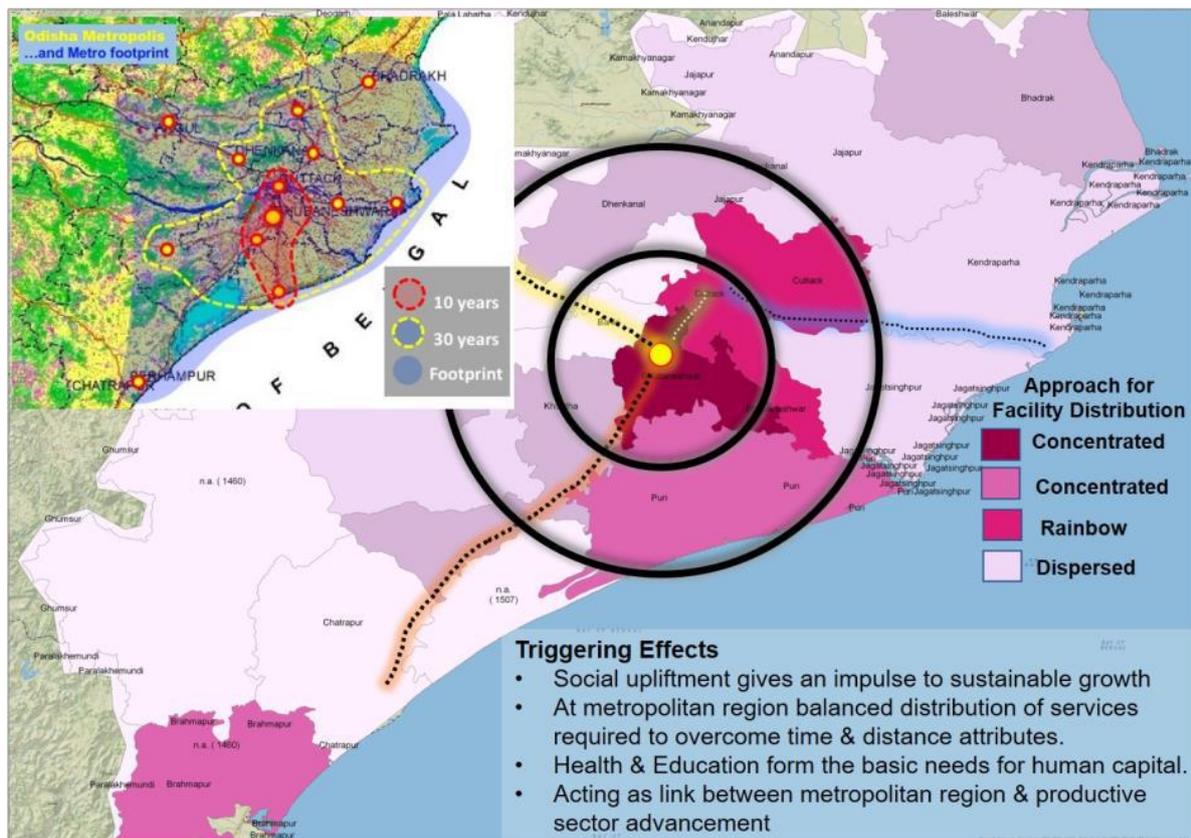
Proposed locations for Health Facilities



Proposed location for large Sports

Phasing: 10-year and 30-year targets

For a 30-year Plan phasing is essential. Two landmarks have been established. The 10-year target and the final 30-year one. The overall objective of Bhubaneswar metropolis is to decongest the centres of Bhubaneswar and Cuttack and incorporate the metropolis to the productive process of wealth creation and the spread and access of all the metropolitan population, focusing on the most in need, to the social benefits of a modern welfare state. This objective will not be reached immediately. Congestive concentrating forces will still have their go, and decongestion will be a progressive, and hopefully sustained, task. That is why the 10-year landmark will still have as an objective to serve the existing concentrated population and expand services as the housing and transport plans will reach their decongestion goals. The alternative, pushing for the outskirts of the metropolis introducing the large social facilities at these peripheral locations, might complement the de-concentration push with those service magnets, but might incur in large social investments of limited use for some time. India, nor Bhubaneswar, can allow itself to misuse the scarce resource available in a difficult development process, where all available assets must be taken best advantage of.



Project Phasing and Development

Integrated policies

a. Integration as a problem-solving strategy

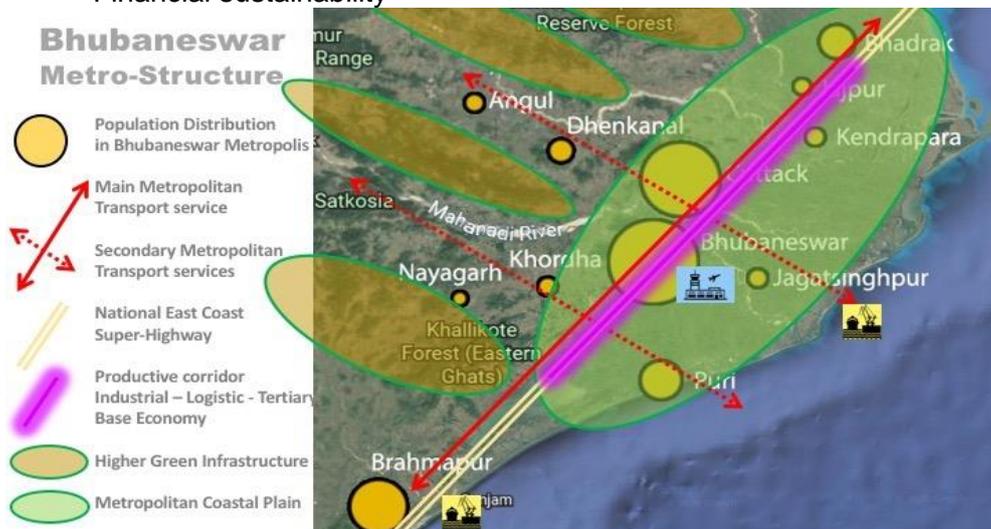
The Metropolitan workshop provides a snapshot of what could be an integrated Metropolitan Plan for Bhubaneswar metropolis. In the short time of the Workshop this one has concentrated in one of the most difficult tasks of any metropolitan planning. That is integrating the different sectors of a metropolis in a synergic/multiplier vision that will allow for sectors Plans to be carried out specifically for each sector within the consistent framework for the metropolis. The

actual concentrating tendency produces a series of negative effects that Bhubaneswar is already experiencing. These harmful derivative effects range from

- **Congestion & gridlock**, both in traffic and in socio-economic infrastructures.
- **Land prices increase**, as central congestion reduces available land for development.
- **Land Supply insufficiency**, as prices are high, developers cannot respond to market needs.
- **Housing prices**, high land prices result in high housing prices and more slums.
- **Affordability strains**, people cannot pay the unaffordable housing prices.
- **Social exclusion**, lower incomes are the ones marginalized in spatial or quality terms.
- **Slums promotion**, less affordability produces more slums.
- **Environment invasion**, lack of available land produces uncontrolled land invasion.
- **Risk prone location**, uncontrolled invasions are mostly in adequate locations.
- **Hazards & disasters**, those locations, as flood plains, are prone to hazards and disasters.
- **Peripheral Social Facilities**, due to expensive central locations
- **Lack of mobility**, due to lack of metropolitan transport modes.
- **Inaccessible Social Facilities**, due to lack of metropolitan transport
- **Labour constraints**, inaccessible peripheral jobs for central dwellers, and vice versa.
- **Productivity costs**, lack of accessible adequate labour supply increases costs.
- **Competitiveness**, higher costs reduce national and international competitiveness.
- **Underdevelopment**, lack of competitiveness reduces or stops development.
- **Unsustainability**, un-development produces social costs and environmental depletion.

As an alternative to this sombre situation, inefficient, inequitable, and unsustainable, the integrated model does promote a **housing strategy distribution based on:**

- Mass public transport
- TOD Development
- Environmental protection and promotion.
- Green infrastructure integration.
- Financial sustainability



The Metropolitan Mental Map, integrating the 5 Physical Components



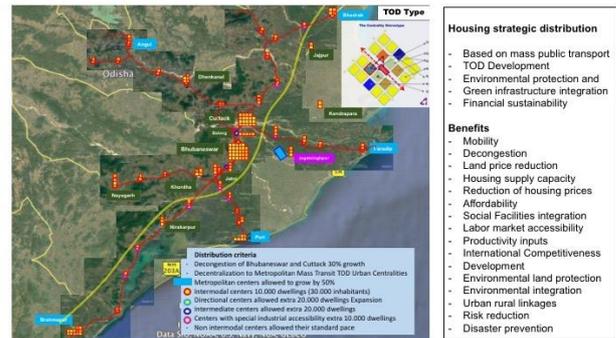
Environment



Transport



Unsustainable housing do-nothing approach



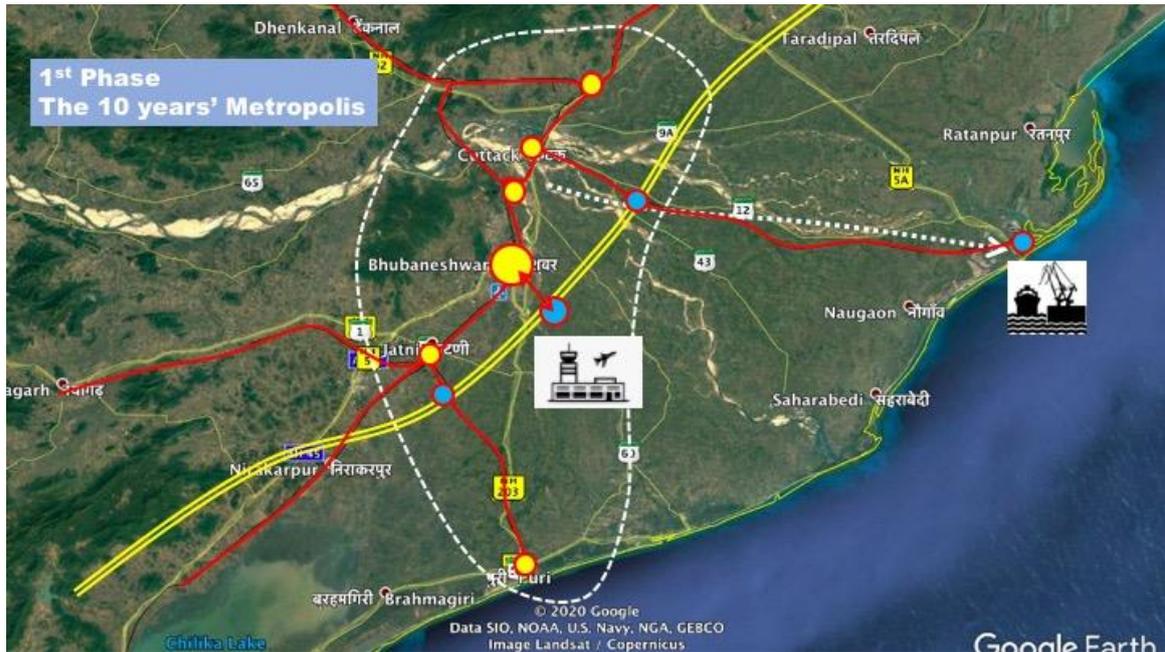
Sustainable, efficient, and equitable integrated housing policy

The benefits of these proposed policies are:

- **Mobility**, as metropolitan transport is intermodal and integrated.
- **Decongestion**, as alternative locations are available and affordable.
- **Land price reduction**, Large supply of land reduces the land price.
- **Housing supply capacity**, More land available, where insufficient now.
- **Reduction of housing prices**, affordable land promotes affordable housing.
- **Affordability**, affordable housing production would be more at reach.
- **Social Facilities integration**, affordable land allows for social facilities proximity.
- **Labour market accessibility**, metropolitan mobility will expand labour market accessibility.
- **Productivity inputs**, as labour market increases demand will better fit supply.
- **International Competitiveness**, productivity will foster international competitiveness.
- **Development**, as result of higher productivity and competitiveness.
- **Environmental land protection**, higher standards, and protection requirements.
- **Environmental integration**, TOD Metro strategy allows for interstitial green integration.
- **Urban rural linkages**, Environmental proximity allows for metro/rural development.
- **Risk reduction**, rightly allocated land for development reduces or prevents risk.
- **Disaster prevention**, no risk reduces disaster situations and allows for better response.

b. Short terms quick wins for immediate action

As a result of these policies a set of strategic priority projects emerge. As Planning is 'Making immediate decisions with a general vision of the future', immediate decisions need to be proposed as the result of the workshop.



The 'immediate' metropolis: 1st phase 10-year priority target

The objective of the workshop is not just to integrate metropolitan components to make the future metropolis equitable, efficient, and sustainable, it is as well to detect the projects that have to be started right away to reach those objectives in the lesser time possible with the lesser effort, or at least within the financial and institutional capacities available.

The first 10-year Phase would be developed in 3 consecutive time segments:

- **First Time Segment (Up to 3rd year)**
 - **Cuttack – Bhubaneswar Commuter service**
 - 25 km: 125 m USD - Ridership: 300.000 daily
 - Fare amortization impact: 12 cts. USD (9 rupees)
 - **5 Intermediate TOD's** (land for 75.000 housing)
 - Interstitial **environmental protection**
 - **Social Facilities** free land development on TOD's
 - Housing decongestion, affordability ease
- **Second Time Segment (up to 7th year)**
 - **Commuter extension to Jatni and Tangi**
 - **National Highway** in service
 - **Industrial parks** reserve and projects
 - **Research and Development** reserves and projects
 - **Airport** reserve and project
 - **Economic Centralities** reserve and projects
 - **5 extra TOD** extensions (125.000 Housing land)
 - **Watersheds protection** and disaster prevention
 - **Social Facilities** extra free land on TOD's
- **Third Time Segment (Up to 10th year)**
 - Commuter extension to Puri
 - Airport approval and finance

- Airport city land pooling development
 - Industrial parks under construction
 - Foreign investment
 - Brownfield regeneration for new provisions
-
- **Further development (Beyond the 10th year horizon)**
 - Will require a Structural Plan revision and calibration.

III. Next Steps and Follow Ups

Each of these projects and plans will require specific development. The corresponding draft proposal submitted to a Cost-Benefit Feasibility Study, not just to find the efficiency of the investment but to compare the opportunity cost with other alternative projects. In this opportunity cost evaluation, the vision should be long term, not just immediate benefits. Some of those projects will trigger other more relevant projects. For instance, the National East Coast Highway. Other projects might be the stepping stone, the multiplier effect for a myriad of projects in different sectors that would have an integrative and synergic benefit. For instance, the Commuter Service.

Once the projects are technically proven essential for Bhubaneswar metropolitan development the most difficult path needs to be undertaken: The Finance and Governance. The institutions representing interests that are going to be benefited must be involved and empowered with the project. Finance needs to be agreed and for these divisible externalities need to be found in the project to have the private sector financing the whole, or parts, of the project.

The development of the Bhubaneswar metropolis needs to be led by the State Government with strong involvement of the central government in collaboration with municipal authorities, sectoral agencies and private sector institutions and firms. International financial institutions need to be approached to explore collaborations.

Most of these projects are unavoidably necessary for development of Bhubaneswar and India. Experience shows that it takes some time for the authorities to realize the necessity. The difference of development and underdevelopment is reflected in the speed of the institutions to make the right decision, to implement these projects, in the shortest time. This would reflect the Collective Intelligence of the Metropolis understood as 'the capacity of a group (in this case the Metropolis) to make the right decision in a reasonable span of time'.

The projects identified in the Web Lab have immense possibility of developing further but, the state will require substantial support not just from the central government but also donors to take these forward. The Follow up of the project could be, to explain the results of the Workshop to the state authorities and decision makers. The EU can respond to their needs by offering the know-how of similar projects in Europe, both in technical and management terms.

IV. Proceedings

The Web Lab began with Mr. Neelabh Singh, Team Leader IEUP Welcoming the participants and giving a brief background of the IEUP project, the objectives of the Web Lab and information about its conduct.

This was followed by opening remarks from Ms. Kamilla Kristensen Rai, Counsellor, EU Delegation to India. Ms. Kristensen described the EU's commitment to supporting sustainable urbanization in India and specifically mentioned the previous and ongoing commitments. Ms. Kristensen concluded by hoping that the deliberations would prove fruitful and that these could be discussed further for possible implementation.

The Keynote address was delivered by Shri. Prem Chandra Choudhary, IAS, Commissioner Bhubaneswar Municipal Corporation and Vice Chairman, Bhubaneswar Development Authority. He welcomed the Weblab and highlighted the fact that the time was right to be discussing the metropolitan future of Bhubaneswar. He mentioned some of the interventions being undertaken under the Smart City Mission and outlined his vision for a world class future for Bhubaneswar.

Ms. Sriparna Iyer, Key Expert IEUP then introduced Mr. Pedro B. Ortiz, the International Expert and facilitator of the Web Lab. Mr. Ortiz is an internationally acclaimed metropolitan planner with a globally impressive body of work. He has been the Mayor of the central district of Madrid and thus presents a great mix of academics and practical knowledge on how cities and metropolitan regions function. Mr. Ortiz is a Visiting Fellow at the Marron Institute of the New York University and continues working with cities across the globe as they tackle their metropolitan problems. The Web Lab began immediately after. The Teams were introduced, and each Team made their presentation on the existing situation in their specific thematic area. The **presentations** made on **Day 1** are included in **Annex 2**. Some of the highlights of the presentations are as follows:

- **Environment:** The presentation described the fact that Bhubaneswar has many water bodies inside and outside the city. The city has partial sewerage coverage, and this posed a threat to the degradation of water quality. Pollution levels have increased as an outcome of increased migration, urbanization and industrialization and the ground water level decreased by 1m in the major areas of the city. The area is facing excessive summer heat with the average temperature being around 40°C, the absence of seasons and frequent natural disasters like cyclones and low-pressure circulations in the Bay of Bengal. The presentation described some of the initiatives undertaken under the Smart City Mission like introduction of Environmental Monitoring System; municipal waste management initiatives; restoration and preservation of wetlands; etc.
- **Transport:** The presentation discussed the reduction in the share of public transport (6%), and a rise in two-wheeler traffic (58%). To address this, the Smart City Mission has introduced several interventions to enable improvements in public transport.
- **Housing:** The presentation mentioned that 36% of Bhubaneswar's population lived in slums and the number is rising. This is a result of the fact that Bhubaneswar is a primate city and the hub of employment opportunities and higher-level social services. The public housing schemes were described as were the interventions under the shelter for urban homeless interventions. Bhubaneswar is the only state in India that has enacted the Land Rights to Slum Dwellers Act 2017 that is a key step towards housing for the urban poor. The presentation highlighted the overall commitment of the state to address the housing issues.
- **Social Facilities:** The presentation informed that there was not too much attention given to this sector in the past and that interventions are being designed and implemented under the Smart City Mission. The focus is more on empowerment and promoting safe cities and not too much on the provision of physical infrastructure.
- **Productive Facilities:** The presentation mentioned that Bhubaneswar has the 5th lowest per capita income, the 6th highest poverty. While the state is among the leading mining areas, there is limited processing, and this is one of the reasons for the low per capita income. The state government has made some interventions including business events to promote the state as an investment destination. In recent years, Bhubaneswar has emerged as an education hub but, the benefits are not being gained by the state.

Subsequently Mr. Ortiz led a presentation on metropolitan planning describing the differences between strategic planning and structural planning. He described the concepts in some detail and gave examples from across the world. Mr. Ortiz explained the task for the next few days in detail and asked that the Groups spend the next week revisiting their sectors through the metropolitan planning framework.

In the period between 10-18 December 2020, there were one on one discussions with the different groups and Mr. Ortiz as they worked on identifying specific projects for their sectors.

Day 2 of the Web Lab on 19 December 2020 began with a recap of the proceedings of Day 1 by Mr. Neelabh Singh. Immediately thereafter, each of the Groups presented the projects that they had identified for their sector. These **presentations** made on **Day 2** are included in **Annex 3**. The projects identified in each of the sectors are as follows:

- **Environment:** The presentation described the 'Blue Zone' i.e., where the Development Authority should designate climate adaptive design of structures; the 'Water Corridors' that are to be protected through increased inter-agency cooperation to protect the natural drainage lines; the 'Eco-Tourism' belt that is to be created as a continuous network that links with existing sites and a 'Green Corridor' that links existing forests and wetlands. These concepts provide guidance to the most appropriate siting of infrastructure based on land suitability.
- **Transport:** The presentation described the current issues specifically, the absence of good connections between the different urban centres, the ineffective use of the existing rail network and the need to expand the airport and the port. The recommendations included one for a commuter rail and TOD's, the East Coast Highway, an additional airport for light freight.
- **Housing:** The presentation described the 14 urban centralities, projected housing requirements in the next 30 years and presented two scenarios – 'Do nothing' and 'Transit Oriented Development'. The presentation also did a demand structuring across various income bands and identified the sources of funding demand for the various income groups.
- **Social Facilities:** The presentation described the present status of education, medical and sports facilities and went on to define clear belts for siting social facilities linked to the development of transport.
- **Productive Activities:** The presentation described the different productive activities in the region, identified potential economic nodes and the integration of this sector with the others in the overall metropolitan structure. There were two proposals for consideration – developing an international freight airport and a port city.

Mr. Ortiz subsequently discussed the **cross sectoral integration** of projects with the centrality of environment. The **presentation** is included in **Annex 4**.

The Web Lab had invited some observers who were asked to share their comments on the event. The details are as follows:

- Dr. Kajri Mishra is the Dean of the Xavier Institute of Human Settlements, Bhubaneswar. She has over three decades of teaching and practice in both urban and rural development. She spoke on the overall metropolitan challenges in governance to manage Bhubaneswar's metropolitan vision of 'harnessing urban explosion'. Dr. Misra said that Bhubaneswar was at the cusp of growth and the time was right to plan and Bhubaneswar has the luxury of learning from elsewhere. She mentioned that there are two kinds of challenges – one is related to the internal capacities needed to take forward the ideas proposed by the international experts and the other is to do with regulatory capacities. She said that the state was yet to build socio-technical capacities, this is to be state led but there are no guarantees and the political buy-in needs to be bottom up that seems difficult currently in the absence of participatory processes. The involvement of the multiple departments in decision making poses regulatory difficulties as does the very strong rural-urban divide. There is need for an overarching governance framework that is bottom up with centralised decision making as envisaged under the Metropolitan Planning Committees in the 74th Amendment. An effective MPC is the key to metropolitan development.

- Dr. Tathagata Chatterji is a Professor of Urban Management and Governance at the Xavier Institute, Bhubaneswar. He spoke about enhancing the productive base for metropolitan development, the factors required for job creation, the sectors that have potential for development and public policy related issues that require consideration. He said that Bhubaneswar is doing well in attracting capital and even in the last few months has been able to attract Ra. 1000 crore. He felt that there is need to put in place a link between metropolitan areas and spatial outcomes, a TOD like this can help manage Bhubaneswar from bloating like a Mumbai or Kolkata. There is need to develop specific sub sector strategies within the manufacturing sector, in the services sector to build on the education and IT advantages that Bhubaneswar has, extend tourism as a cultural economy sector – cluster development, in a shift from the current metro level development. Dr. Chatterji talked about Bhubaneswar being perceived as a gateway for goods and services and tourism.
- Dr. Angelique C. Rajan is Professor Urban Planning & Governance, Henley Business School, University of Reading UK participated on both days of the Weblab. In her comments she focused on the environment and said that providing for it enables other things like access to green spaces, connectivity linked to ecosystem of the area, productive use of open space. She felt that decision makers need to think of environment in different ways and balance development inputs with environmental outcomes.
- There was some discussion on whether the time had come to do things differently in the situation post COVID with increased use of technology. Respondents discussed how pandemics can speed up but not change the future, the fact that the pandemic has shown the importance of ‘governance’ i.e., the ‘software’ or people’s behaviour that has dictated the COVID response across the cities in fact, the shape and design of cities did not have any influence on COVID response. The use of technology can prompt a rethink in the use of space with the need for physical infrastructure perhaps lessening.

Mr. Neelabh Singh thanked all the participants and especially the Bhubaneswar Municipal Commissioner for his support and cooperation in the organization of the workshop. There were about 40 participants on both days of the workshop and the **list of participants** is included in **Annex 5**.

Annexure 1 - Agenda for the Web Lab

MAINSTREAMING RESILIENCE IN METROPOLITAN PLANNING WEB LAB WITH THE CITY OF BHUBANESWAR AND THE DELEGATION OF THE EU IN INDIA 09 DECEMBER 2020 AND 19 DECEMBER 2020

Zoom Link:

<https://zoom.us/j/93876222298?pwd=Q3lvTllyUThJcHg1SU5qbHNValBNdz09>

AGENDA

DAY 1: 09 December 2020

TIME: 11.00 am to 3.30 pm

DAY	DURATION	TIME	PROGRAMME
Day 1	30 min	INAUGURATION	
		11.00 – 11.05	Welcome and introduction on the objective of the Web Lab and its practical conduct – Mr. Neelabh Singh, Team Leader IEUP
		11.05 – 11.15	Opening Remarks – Ms. Kamilla Kristensen Rai, Counsellor, EU Delegation to India
		11.15 – 11.25	Keynote Address by Mr. Prem Chandra Chowdhary, IAS Commissioner Bhubaneswar Municipal Corporation and Vice Chairman Bhubaneswar Development Authority
	11.25 – 11.30	Introduction to Mr. Pedro Ortiz and commencing the Web lab – Ms. Sriparna Iyer, Key Expert IEUP & Moderator	
	1 hr 35 min	ESTABLISHING THE BASELINE: THE BHUBANESWAR METROPOLITAN REGION	
		11.30 – 11.50	Overview of Metropolitan Planning – Mr. Pedro Ortiz
		11.50 – 12.05	Thematic presentation on Transportation in Bhubaneswar
		12.05 – 12.20	Thematic presentation on Housing in Bhubaneswar
		12.20 – 12.35	Thematic presentation on Social Facilities in Bhubaneswar
12.35 – 12.50		Thematic presentation on Productive Activities in Bhubaneswar	
		12.50 – 13.05	Thematic presentation on Environment in Bhubaneswar
		BREAK 13.05 – 13.30	
		All participants to rejoin at 13.30 sharp	
		PLANNING FOR A RESILIENT METROPOLITAN BHUBANESWAR	

2 hr	13.30 – 13.40	Summary of key challenges faced across the thematic areas & outline for the session - Ms. Sriparna Iyer, Key Expert, IEUP & Moderator
	13.40 – 15.15 Led by Mr. Pedro Ortiz	Choose a project/detail an intervention to address most of the challenges identified in the specific thematic areas <ul style="list-style-type: none"> Respond to: Which, Why, Where, How, Feasibility and Implementation (Definition, Purpose, Location, Engineering, Finance and Governance) Instructions for Day 2 and Format of final template for presentation: 7 slides and 9 pages.
	15.15 – 15.30	Q&A and Wrap Up of Day 1

From 10 December 2020 to 15 December 2020

Each of the Groups will work on preparing a presentation as per the guidance given by Mr. Pedro Ortiz

The presentations are to be shared with the IEUP Team by 5.00pm on 15 December 2020 (sriparna.iyer@ieup.eu and siyer@ipeglobal.com)

AGENDA

DAY 2: 16 December 2020

TIME: 11.00 am to 3.30 pm

DAY	DURATION	TIME	PROGRAMME	
Day 2	2hr 35 min	THE VISION FOR KOCHI'S METROPOLITAN FUTURE		
		11.00 – 11.05	Welcome; Agenda for Day 2 and Recap of Day 1 – Mr. Neelabh Singh, Team Leader IEUP	
		11.05 – 11.35	Presentation by Transport Team	
		11.35 – 12.05	Presentation by Housing Team	
		12.05 – 12.35	Presentation by Social Facilities Team	
		12.35 – 13.05	Presentation by Productive Activities Team	
		13.05 – 13.35	Presentation by Environment Team	
	BREAK 13.35 – 14.00			All participants to rejoin at 14.00 sharp
	45 min	THE ROAD AHEAD		
		14.00 – 14.05	Recap of Morning Session – Ms. Sriparna Iyer, Key Expert, IEUP & Moderator	
	45 min	14.05 – 14.45	Strategic Guidance and Roadmap – Mr. Pedro B. Ortiz	
		14.45 – 15.00	Comments from Select Observers	
		15.00 – 15.25	Open Forum	
15.25 – 15.30		Vote of Thanks – Mr. Neelabh Singh, Team Leader, IEUP		

Annexure 2 - List of participants

Name	Organisation
Aakriti Singhai	Urban Planner (Independent)
Aeshvry Rajaura	Urban Planner (Independent)
Albert Raja N P	Urban Planner (Independent)
Amir Keshavarz	Urban Planner (Independent)
Angelique Chettiparamb	Professor - Urban Planning, University of Reading, UK
Atanu chatterjee	Professor, Xavier University, Bhubaneswar
Babalola Olufunke G	Urban Planner (Independent)
Bhubaneswar Development Authority	Government
Biswadeep Acharya	Urban Planner (Independent)
Bmc DC F & CS	Government
BSCL Team	Consultant (Bhubaneswar Smart City Limited)
Chetan Vaidya	Ex-Director, NIUA & Independent Consultant
Daniyal Hasan	Urban Planner (Independent)
Deepakshi Vashishth	AETS
Devshri Shah	Consultant, Bhubaneswar Urban Knowledge Centre
ESNO# BSCL	Consultant (Bhubaneswar Smart City Limited)
Frédéric Woringer	AETS
Jai Dighe	Consultant, Bhubaneswar Urban Knowledge Centre
Jublee Mazumdar	Professor, Xavier University, Bhubaneswar
Dr. Kajri Mishra	Dean, Xavier University, Bhubaneswar
Kamilla Kristensen Rai	EU Delegation
Kishmita Arora	Urban Planner (Independent)
Madhivadhani Kalaiselvan	Urban Planner (Independent)
Mark Roeland De Castro	Urban Planner (Independent)
Nalin Ranjan	Professor, Xavier University, Bhubaneswar
Neelabh Singh	IEUP Project
Payal Dash	Consultant IBI Group (Bhubaneswar Smart City Limited)
Pedro B. Ortiz	IEUP Project
Piyush Girgaonkar	Urban Planner (Independent)
Pragya Prakash	Urban Planner (Independent)

Prashant Prasad	Professor, Xavier University, Bhubaneswar
Prem Chaudhary, IAS	Municipal Commissioner – Bhubaneswar & Vice Chairman, Bhubaneswar Development Authority
Saloni Hibare	Urban Planner (Independent)
Sanjay Dhawan	AETS
Sarojini Brahma	Gender Specialist (Bhubaneswar Smart City Limited)
Shraddha Kumar	Professor, Xavier University, Bhubaneswar
Smruti Rekha Nanda	Program - Humara Bachpan
Sriparna Iyer	IEUP Project
Onkar Mohanty	Assistant Town Planner, Bhubaneswar Development Authority
Swayamprakash Mohanty	Consultant, Bhubaneswar Urban Knowledge Centre
Tathagata Chatterjee	Professor, Xavier University, Bhubaneswar
VC - OFFICE	Vice Chairman, Bhubaneswar Development Authority
Vishal Jain	Consultant, Bhubaneswar Urban Knowledge Centre
Ridhisha Agarwal	Consultant IBI Group (Bhubaneswar Smart City Limited)
Adil Zeya	Consultant IBI Group (Bhubaneswar Smart City Limited)
Manish	UNFPA

Annexure 3 - Presentations from Day 1

Transport



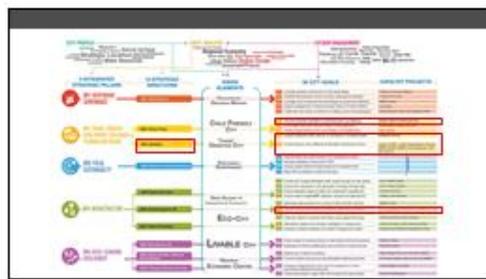
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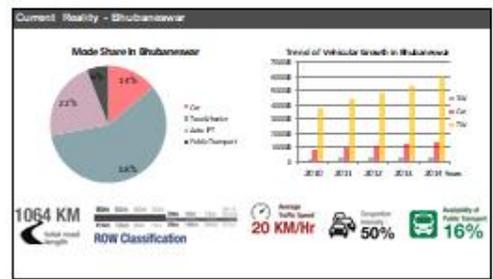
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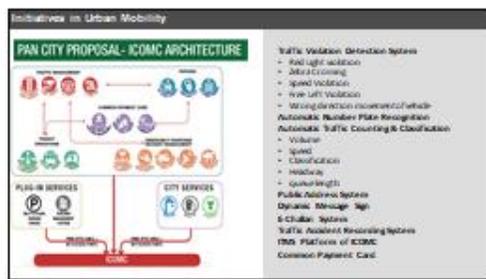
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Problems	Possible solutions	ITS Approach
Lack of mobility and accessibility	Procedural flexibility, access to quality transportation services	Multi-modal hub, Helpline Services (CPOD)
Traffic Congestion	Improve mobility, convenience and reliability, centrally controlled traffic	Advanced traffic control system, HD Camera, Automatic traffic counting and classification system, Public Address system, Multi-lane in the signal control system
Traffic Accidents, Traffic violation	Improve safety, Awareness	Automatic Number Plate Recognition, Traffic Violation Detection system, Installation of Accident Recording device, Real time notification, Public Address system

6



7



8



9



MO CYCLE

- 2000 CYCLES
- ADJUSTABLE SEAT
- UTILITY BASKET
- GPS ENABLED
- UNISEX IND. CYCLE
- 30 MINUTES FREE PARK
- FIRST & LAST MILE CONNECTIVITY WITH IND. BUS

10



MO BUS

- 200 BUSES
- FREE WIFI
- ON BOARD ANNOUNCEMENTS
- E-ICECING
- CCTV SURVEILLANCE
- ONLINE TRACKING
- PUBLIC INFORMATION SYSTEM DISPLAY
- COMMUNAL PAYMENT CARD SYSTEM

11



MULTI MODAL CAR PARKING

- ATRAJ MAHAL SQUARE**
2 BASEMENTS, GROUND, AND 7+ FLOORS
450 EQUIVALENT CAR SPACE
57,000 Sq Ft
AREA OF DEVELOPMENT: 0.947 AC
- AT SAHIB NAGAR**
2 BASEMENTS, GROUND, & 5+ FLOORS
250 EQUIVALENT CAR SPACE
38,000 Sq Ft
AREA OF DEVELOPMENT: 0.731 AC

12



FINANCIAL INTEGRATION

- UTILITY PAYMENTS, PARKING
- RETAIL PURCHASE
- ONLINE TRANSACTION
- INTEGRATION WITH INTELLIGENT TRANSIT SYSTEM
- POS MACHINE ENABLED
- INTEGRATION WITH MOBILE WALLET, INTERNET BANKING, MICRO ATM

13



SMART JANPATH

- DEDICATED CORRIDOR FOR PEDESTRIANS, CYCLISTS
- 3.8KM ROAD LENGTH
- STREETScape DESIGN
- REHABILITATION OF EXISTING PAVEMENT
- REHABILITATION OF MAJOR AND MINOR BRIDGES
- LANDSCAPING

14



OTHER INITIATIVES

- raahgiri day**
apni footpath | apni speed
BHUBANESWAR
- Green Walk**
- #CYCLEGIRI**
#green@bhubaneswar

15

WAY FORWARD

- Institution of user governed bus-stops
- Construction of self-policing transport lanes to regular vehicle
- Safety for all, Accessibility for all, Mobility for all
- Add new data to existing data and resources, water logging, that will help stakeholders to recover from vehicle

16

Housing



1



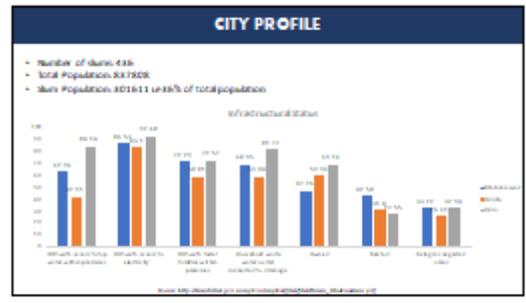
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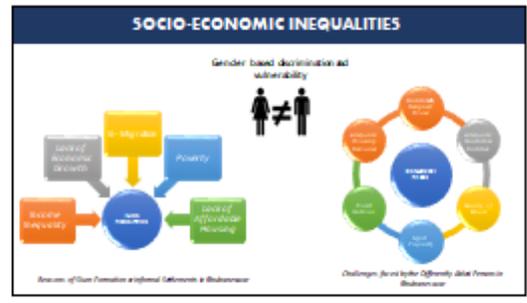
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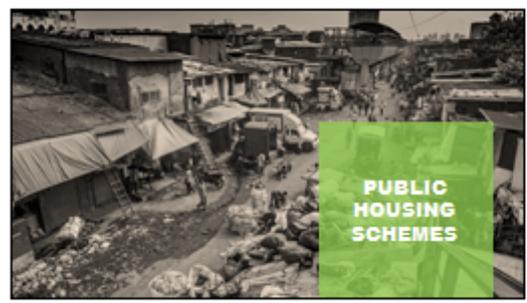
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7

S/No	Project Details	Status of Bhubaneswar
1	Projects Approved	8
2	Total Project Cost (approx. in crores)	56.35 Cr
3	Total no. of dwelling units approved (in no.)	1718
4	Total no. of dwelling units approved (in lakhs)	0
5	Total no. of dwelling units approved for completion	245
6	Total no. of dwelling units approved	1963

S/No	Project Details	Status of Project
1	Projects Approved	18
2	No. of Dwelling units sanctioned	11235
3	Dwelling units under progress	4112
4	Dwelling units completed	3312
5	Total Additional Central Assistance received	149.70

8

S/No	Project Details	Status of Project
1	Total PMAY in Bhubaneswar	211809
2	Total Housing shortage	88102
3	Proposed under PMAY-PRAY	8729
4	Covered under JRP-PMAY	5548
5	Covered under In-Situ-PMAY	1200
6	Covered under other Housing schemes (BSUP, RAY)	5847
7	Total demand covered	19134
8	% of demand covered	21.45%
9	No. of housing units to be covered	52588
10	% to be covered	76.55%

9

SHANTINAGAR AWAS YOJANA



AREA OF DEVELOPMENT
PPP Model: 10.00 Crores
RFC Model: 4.50 Crores

PROJECT STATUS
PPP Model:
Development Agreement (DA) Awarded
Pre-construction activities (Construction Proceeding as per RFC Model)
Agreement is to be done with the Agency.

OBJECTIVE
Provision of physical and social infrastructure to and/or around housing clusters of slum-poor both in urban and surrounding areas.

10

KEY FINDINGS & OBSERVATIONS

01. Lack of the project team and proper kind of construction plan.	05. Lack of Policy document along with drawings.
02. No proper plan for the project.	06. No proper location of each cluster.
03. No proper plan for the project.	07. Funds are not enough to get the project.
04. No proper plan for the project.	08. No proper plan for the project.

11

CHECKLISTS TO ADDRESS THE CHALLENGES

- 1. Proper implementation of the Urban Regulatory Authority (URA) Act.
- 2. Provision of the Urban Regulatory Authority (URA) Act.
- 3. Provision of the Urban Regulatory Authority (URA) Act.
- 4. Provision of the Urban Regulatory Authority (URA) Act.
- 5. Provision of the Urban Regulatory Authority (URA) Act.

12



SHELTER FOR URBAN HOMELESS

13

SHELTER FOR URBAN HOMELESS IN ODISHA



- 1. No project plan for the project.
- 2. No project plan for the project.
- 3. No project plan for the project.
- 4. No project plan for the project.
- 5. No project plan for the project.

14

KEY FINDINGS & OBSERVATIONS

KEY ISSUES OF SHH	KEY ISSUES OF SHH
1. No project plan for the project.	1. No project plan for the project.
2. No project plan for the project.	2. No project plan for the project.
3. No project plan for the project.	3. No project plan for the project.
4. No project plan for the project.	4. No project plan for the project.
5. No project plan for the project.	5. No project plan for the project.

15

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- 4. Provision of the Urban Regulatory Authority (URA) Act.
- 5. Provision of the Urban Regulatory Authority (URA) Act.

16

PROJECT KUTUMB



AREA OF DEVELOPMENT
0.45 Crores

MATERIALS

- Rental housing for construction workers of 200 beds.
- Ashir Centre (subsidized cooked meal).
- Water ATM and other required amenities.
- 50 beds for Senior Citizens.
- Donations along with the demand for a good.

17



ODISHA LAND RIGHTS TO SLUM DWELLERS ACT 2017

18

ODISHA LAND RIGHTS TO SLUM DWELLERS ACT 2017

Land Rights

- ✓ Heritable but not transferable
- ✓ Only for residential & residential cum livelihood purpose
- ✓ Mortgageable for housing loan based transferable
- ✓ Land right certificate

For Urban Poor

- ✓ upto 30 sqm - free of cost
- ✓ faces of 30 sqm - 25 % of benchmark value of land

For Others

- ✓ 50% cost linked to benchmark value of land
- ✓ Creation of Urban Poor Welfare Fund - statutory - Slum self infrastructure development

Industrial framework

- SAC
- Tenure of agency
- Leasing, Conditio
- FSI
- FSI
- State Policy

19

ODISHA LAND RIGHTS TO SLUM DWELLERS ACT 2017

✓ All land rights certificate and certificate of title of beneficiaries, who are beneficiaries of the Act.

✓ 2 lakh Slum households to get land rights certificate

✓ 30000 Slum to be made habitable with basic services

✓ 1,30,000 Land Rights Certificate delivered till October 2018 - 18 lakh more certificates to be delivered in 2019



✓ 100% Urban Poor from Rehabilitation and Resettlement (R&R) Beneficiaries covered across the State

✓ 25% Minimum Budget to be earmarked for development of slum

✓ 30 days 30 days to be provided for the Urban Poor

"Through Odisha Land Rights Mission, the Government will ensure implementation of state land rights mission"
- Secretary, MUDRA

"Through Odisha Land Rights Mission, the Government will ensure implementation of state land rights mission"
- Secretary, MUDRA

20

KEY FINDINGS AND OBSERVATION



- 01 Coverage of the slum dwellers under act
- 02 More than 10% families have not got the certificate
- 03 The valuation of plot is not covered to them
- 04 Beneficial given to construct house is insufficient
- 05 Delay in provision of certificate

21

CHECKLIST TO ADDRESS THE ISSUE

- Engagement of the municipalities to get to reduce the burden of technical agencies
- Need based intervention - Slum to be done
- Public training of SHC members
- Need to develop technical of the local authorities
- Mark boundary to be defined place to the slum

22

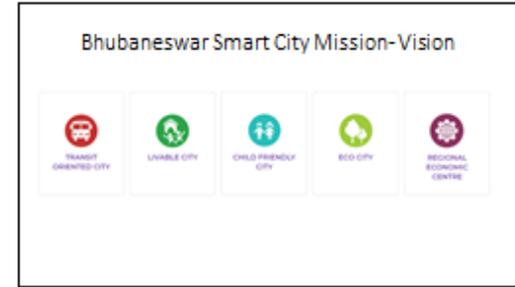
Social Facilities



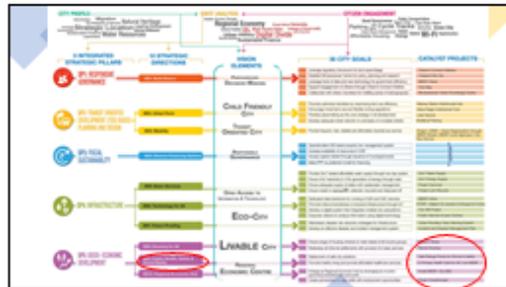
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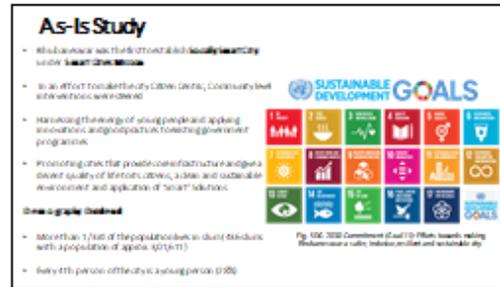
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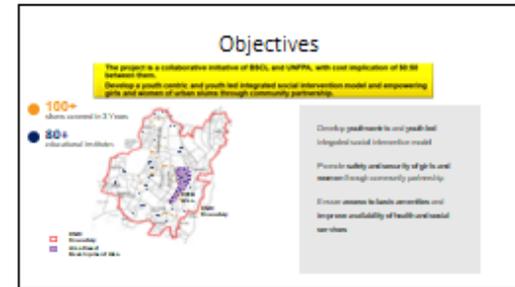
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6

Profile of Bhubaneswar Metropolitan Area

Excerpt - Census 2011

Name	City (Municipal Corporation)	State (Odisha)
Total Population	840036	7003866
Total Population (%)	885.88	
Literacy Rate (%)	91.89%	85.75%
Population Sex Ratio (Male/Female) 2011	7.6	7.19
Area (sq. km)	135	
Share of total population district Urban Population (%)	77.55	
Share of total urban district (%)	4.88	
Density of Population per square km	6228.4	
Male Population %	19.5	7.84
Scheduled Caste (%)	8.27	14.85
Scheduled Tribe (%)	5.04	8.51
South Indian %	20.07	19.85
Working Age pop. 15-59 years %	69.65	67.04

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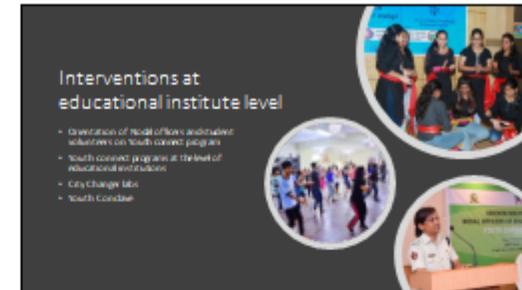
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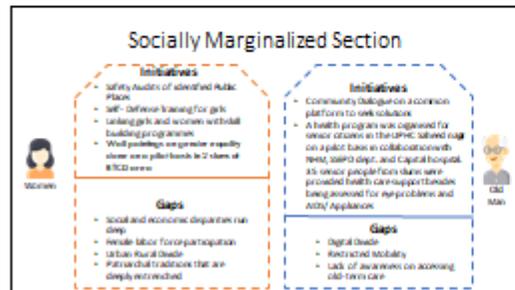
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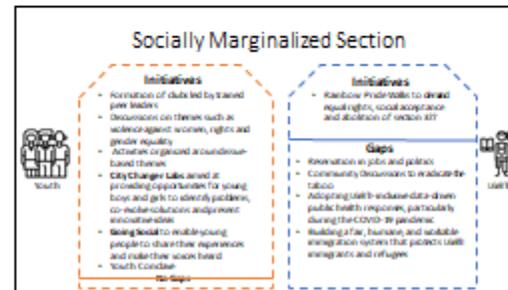
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Productive Activities



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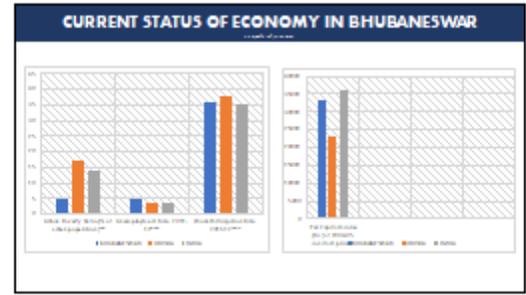
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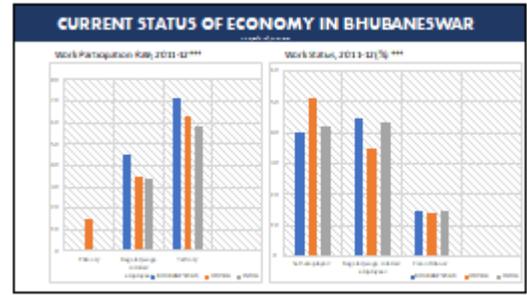
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-
- Slide 7: GAPS
1. Per capita income is 10% lower in India, roughly 1/3 of India's average.
 2. Poverty is 10% higher in the country & 1/3 poverty in rural areas.
 3. Patently low Human Development Index.
 4. A long road lies ahead to overcome structural distortions.
 5. Higher government expenditure is required to address structural distortions, for which a robust system of financing and tax system is required.
 6. Highly skewed demographics.
 7. Land consolidation and land acquisition have been delaying economic development since a long time.

7

Slide 8: INITIATIVES BY IDCO

- idco** (Infrastructure Development Company of Odisha)
- Smart Housing Project (Smart Housing)
- Smart Infrastructure Project (Smart Infrastructure)
- Smart Child Friendly Project (Smart Child Friendly)
- Smart Eco-Friendly Project (Smart Eco-Friendly)

8

Slide 9: INITIATIVES BY IPICOL

- IPICOL** (Infrastructure Project Implementation Company of Odisha)
- Smart Housing Project (Smart Housing)
- Smart Infrastructure Project (Smart Infrastructure)
- Smart Child Friendly Project (Smart Child Friendly)
- Smart Eco-Friendly Project (Smart Eco-Friendly)

9

**INITIATIVES BY
IDCOL**



Merchant Mingle: Initiative has been taken by the Corporation to undertake merchant mingle activities after allotment of low income under reservation mode so that the Corporation can cater to the need of the industry both inside and outside the State. Govt. has been requested to allot the mode. This proposal is under consideration of the Government.



Technology Development: The Corporation has retained work for undertaking modification of equipment at its Farm choline plant to improve efficiency of production and also reduce cost. Tendering process for some equipment has already started.

10

WAY FORWARD

- Creation of an online database on the nature, extent and skill profile of all migrant workers
- Conducive business environment to attract Private Investments
- Free access to basic healthcare should be seen as a fundamental right of every citizen of the state
- The digital divide, unwittingly may widen the learning divide in the society
- NABARD could play an important role in approving these local level institutions, facilitating production, processing, storing, packaging, marketing and availing of credit

11

Environment

ENVIRONMENT BHUBANESWAR, ODISHA

1

THE CITY TODAY

- Bhubaneswar is partially covered with underground sewage collection and treatment system comprising trunk sewers, branch sewers, lines and manholes.
- The total possible water supply capacity to Bhubaneswar city is not from a combination of surface and ground water sources in the region.
- Mulapada, Dupa and Kumbhal Rivers supply over 75% of the total daily per capita requirements of possible water with the balance obtained from groundwater sources such as open wells and bore wells.
- BPMC presently handles the solid waste collection, transportation and disposal across the city (municipal limits which is headed by the Health Officer & supported by sanitary supervisors, compounds).
- Bhubaneswar City generates about 300 MT of municipal solid waste every day comprising both the biodegradable and non-biodegradable components.

2

AS IS STUDY

With increasing population, increasing density and increasing the pollution level, the pollution level in Odisha has reported the levels of municipal pollution meter are still above the standard area in the urban or semi-urban areas. As there is no proper system to manage water in health on per in the city, pollution meter having some in number across the city is to be installed.

FACTORS OF RISING POLLUTION

- Population
- Urbanization
- Industrialization

POLLUTION LEVEL

- Soil - 2%
- Air - 22%
- Water - 20% (BPM)

REASONS BEHIND POLLUTION

- Deforestation
- Lack of ecological reserves
- Population

Average annual temperature 27.4 deg.C
The annual rainfall is 1500mm
The groundwater level has decreased by 100cm in major areas of library

3

INFRASTRUCTURAL ISSUES

WATER SYSTEM

There are 12 major sewer drains running across central Bhubaneswar. Some of these finally join the Cuttack/Chilika. The entire city has been covered with sewer sewer drains.

Renovation of sewer drains, by renovation, clearing of sewer network by people making the sewer sewer drains self-sustainable in making and releasing of drains.

Lack of periodic maintenance of drains. Delays during the maintenance cause in some of visibility problems.

WATER AVAILABILITY IN THE CITY AND REDUCTION IN WATER WASTAGE

2012/2013 Intention (Source PMO) Increase in storage capacity - 80% & O&M development

- Odisha water metering system is 40/70% EPRs
- Average daily base of water supply 22 m 3/20
- Per capita supply 218 ml CPD LPCD
- New reservoir cover 42.6 m 42.5%
- Household water conservation 22% to 25%

4

MAJOR ENVIRONMENTAL PROBLEMS IN THE AREA OF STUDY

DEGRADATION OF WATER QUALITY

- Industrial waste
- Seepage of Wastewater
- Plastic wastes
- Plastic Dumping
- Chemical residues and pesticides
- Leakage from sewage lines
- Polluted irrigation
- Urban development
- Leakage from landfills

DEGRADATION OF LAND QUALITY

- Soil erosion
- Water logging
- Deforestation
- Fragmentation of landfills and pesticides
- Subsidence
- Water logging
- Desertification
- Overgrazing (grazing and forest)

DEGRADATION OF BIO RESOURCES

- Reduction of forest land
- Loss of urban vegetation cover
- Loss of Urban Bio diversity
- Flora/fauna on non-ecological condition
- Carbon footprints
- No focus on building more green infrastructure

5

EFFECTS OF ENVIRONMENTAL DEGRADATION

The effects of degradation of resources has been observed by the residents since last few decades in Bhubaneswar City which areas follows:

- Fastest loss in summer. Average temperature measured in summer is around 40 degree Celsius.
- Scarcity of drinking water in summer and urban flooding in rainy season.
- Absence of linking of all seasons.
- Water pollution and degradation of ground water quality.
- Frequent natural disasters like cyclones, low pressure rainfalls etc.
- Increase in pollution resulting in PM levels in the city.

Major areas of the city	Water level below the ground (Open wells) in meters	
	Year -2004	Year -2010
Uda VIII	7.13	8.25
Uda IX	6.90	7.20
Uda IV	4.58	5.25
Nagajali	7.28	8.10
Tanka Para Road	3.75	5.50
OUAT	3.44	3.50
BPM Nagar	3.15	4.4
Nalini Bahar	3.88	3.45
Burupada	4.51	5.20

Source: Dr. Ashish Kumar Sahoo International Journal of Engineering Research and Applications, Analysis of the Underlying Causes of Environmental Degradation in Bhubaneswar City

6

INTERNATIONAL CASE STUDY: MEXICO CITY

AIR POLLUTION

Largest cause from industrial area (in a vehicle)

PROBLEM DESCRIBED BY: air quality monitoring quality of fuel, introduction restriction

SOLUTION: replacement of technology (a old vehicles for new vehicles)

PROBLEM DESCRIBED BY: flooding, water separation Programme and No. of Sewing City System

PROBLEM DESCRIBED BY: Closure of parking spaces

SOLUTION: The Urban Management Committee has started separate parking and separate parking, which will help in parking and avoid from making the traffic.

PROBLEM DESCRIBED BY: The city water body is an underground water source.

SOLUTION: The city water body is an underground water source.

PROBLEM DESCRIBED BY: The city water body is an underground water source.

SOLUTION: The city water body is an underground water source.

OTHER ENVIRON CONTROL MEASURES

Voluntary about vehicle Programme

Closure of Area vehicle open to outside generate movement and more vehicle which area per a control look for height and in a specially for better public transport

Bandwidth program for them

Filter installation

Comprehensive Pollution Control Programme

Pro-implementation of water resource for day vehicle that are over 10 years old and replacement of water resource in more water vehicle which follow some demand during vehicle separation use.

7

CRZ NORMS VIOLATIONS INVITING DISASTERS IN BHUBANESWAR, ODISHA

- The coastal regulations are highly disoriental and threatened mangrove problems, the pollution, sludge, sewage, landing waste, unregulated coastal development and other activities disturb over the coastal land and forest and its destruction.
- During the pre and post monsoon period, depressions generated in the Bay of Bengal leading to cyclones storm and great severity which through the impact of Odisha coastal stretch.
- Under the Environment Protection Act, 1986 a notification was issued in 1991, for regulation of activities in the coastal area by the Ministry of Environment and Forests (MOEF).
- Through this notification, the Coastal Regulation Zone (CRZ) was established with a width of 500m to 175-300m from the high tide line.
- According to the CRZ regulations the coastal zone comprises all that land with which there has direct contact and also those portions of the land on which there has an influence indirectly through tidal action.

The coastal areas which have been reserved for marine development, sea defence infrastructure in the area reserved by CRZ notification. Besides, there is a need to prepare proper disaster management plan to ensure that the coastal zone of coastal development, which is coastal erosion and preservation of water resource in coastal land and other facilities.

Source: Dr. Pradyumn Kumar Department of Architecture, College of Engineering and Technology, Bhubaneswar

8

BHUBANESWAR SMART CITY MISSION-VISION

SMART CITY

GREEN CITY

WATER CITY

ECO CITY

DIGITAL CITY

TRUST
EMPOWER CITY

Livable City

Child Friendly City

Original Economy (2019)

9

Annexure 4 - Presentations from Day 2

Transport

Mainstreaming Resilience in Metropolitan Planning

List of participants:
 Honors of the Town Leader: K.Madhushankar
 Fellows:
 Anshu Kishore
 Anurag Choudhary
 Sanku Agrawal
 Suman Mondal
 Pradyumn
 Kishor Agrawal
 Animesh Saha

Sector: Transportation
 Integrated Transit System
 201216 Bhubaneswar Weblab

Project title: Integrated Transit System

To promote Transit oriented urban form that promotes active, connected and sustainable mobility choices.

The main aim of this integrated model helps

- Metropolitan Connectivity
- Low carbon emission

•Extended Metropolitan Mass transit Connectivity between Bhubaneswar to Bhadrak has been identified as TOD zone.

•Incremental road integration will increase industrial activities.



Sector Situation

Identified Issues

1. **Concentrated urban growth**
 •Dependent on the local private bus system increasing the transit
2. **Concentrated Economic activities**
 •Historic and dependent Region due to concentrated economic activities.
3. **Ineffective use of existing rail**
 • Existing rail operating inefficiently is usually used to operate passenger train which run at around 20-30 km/hr speed.
4. **Need for Airport and Port expansion**
 • The current airport has already reached about 0 million passengers per year may reach above 12-14 million till 2030.
 •No space for the expansion of runways present.

Sector Quantified Solutions

- Connecting Metropolitan area through Concomer Rail & TOD's
- Strengthening the current available rail network with higher speed and better rolling stock for faster commute.
- Propose New Stations between Jajpur and Cuttack.
- Key Stakeholder: East Coast Railway
- Highway facilitating Economic growth & spread
- Creating an Economic growth corridor from the past and expansion of industrial zoning at a second newly highway providing access to industrial development and connectivity.
- Key Stakeholder: NHAI
- Constructing additional airport for Light freight
- The proposed economic growth corridor will give rise to increase in exports and international air traffic which can be catered to by adding an airport to another end of the Economic growth highway.
- The secondary airport can be a dedicated freight airport, then reducing the current load on the existing airport.
- Key Stakeholder: Airport Authority of India



Integrated Proposal



DESCRIPTION OF THE PLAN: A tied system of transport working seamlessly for local and international economic efficiency and to resolve housing demand.

Objectives:
 Creating and proposing a homogeneous relation for efficient transport system for Bhubaneswar Metropolitan Region.

Criteria:
 Integration of Urban nuclei and connectivity by transport mode.
 (i) CHALLENGE: URBAN - ECONOMIC GROWTH CORRIDOR & SOCIAL INTEGRATION.

Solutions:
 1) Improve Regional Connectivity
 2) Sustainable & Integrated Development
 3) Provide rapid and efficient transport
 4) Facilitate for better trade and international relations

Proposals:
 1) Improving and expanding Concomer Rail and its frequency
 2) Economic Growth Highway
 3) Dedicated Freight Airport

Intermodal Station



Project Type and Location Strategy

Benefit	Project 1	Project 2	Project 3
Benefit	Increase in labour market job, increase employment, improve employee demand - enhance cycle	Increase logistic capacity, Facilitate the connectivity of urban area, Facilitate workers, streamlined operations	Reduce the logistic capacity due to separate facilities, Facilitate workers, streamlined operations
Scope	Urban Brown field, 30km Green field	30 km Green field, Transit ready roads	Green field Single runway airport
Feasibility	3-5 Years	2-4 Years	3-5 Years
Finance	Green field - \$ 200M, Brown field - \$ 25-30M	\$ 5 M per 10m for on-grate and \$ 15 M per 10m for elevated	\$ 200 M
Stakeholder & Administration	State government, Ministry of Railway, State government, Metropolitan transport authority (MPTA), MAFCC	State government, Metropolitan transport authority, State government, MPTA, MAFCC	Ministry of Civil aviation, State government, MPTA
Spill-over effects	Increase in quality of life, Land value, Reduced congestion & accidents	Increase in employment and land value	Increase in production of high value added goods

1. Efficient Concomer Rail System: Gains proper track of steel infrastructure with faster system
2. Highway for Economic Growth: Lackage of coastal transit lanes

Project Development and implementation

Implementation Strategy

- Prioritization of projects: Short, Medium, Long Term
- Feasibility study: Costing, Cost Benefit analysis, EIA, Social impact and rehabilitation
- Planning
- Approval: Centre/ state and other authorities
- Funding: Equity sharing, PPP, FDI, Bonds
- Implementation: Governing bodies and all stakeholders

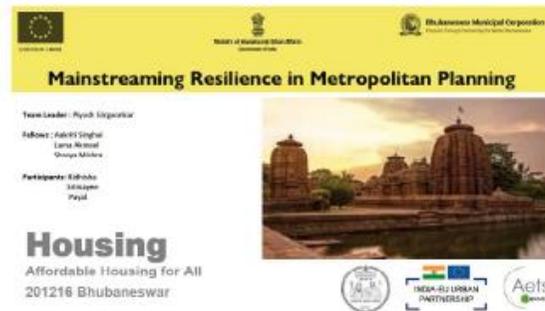


• Projects selected for facilitating efficient transport have multiple stakeholder participation and in order to operate the projects smoothly, an umbrella agency for Bhubaneswar Metropolitan region should be formed
 • All other urban agencies should be equal stakeholders.

"A Metropolis is a set of Urban Units that share Significant daily commuting"

THANK YOU

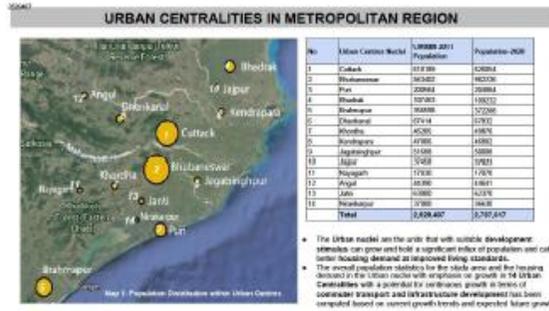
Housing



Mainstreaming Resilience in Metropolitan Planning

Team Leader: Piyush Singhpurwal
Follows: Ashwini Singhal, Laxmi Nayak, Chaitanya Mishra
Participants: Chaitanya Mishra, Piyush Singhpurwal

Housing
Affordable Housing for All
201216 Bhubaneswar

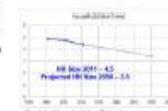


URBAN CENTRALITIES IN METROPOLITAN REGION

No.	Urban Center Name	Urban Area (km ²)	Population (2011)	Population (2048)
1	Cuttack	337.339	4,28,914	5,28,914
2	Bhubaneswar	145.522	1,62,700	2,12,700
3	Puri	2,299.81	2,29,981	2,29,981
4	Bhadrak	1,57.951	1,57,951	1,57,951
5	Balasore	34.008	1,27,000	1,27,000
6	Khordha	1,074.4	1,07,400	1,07,400
7	Bolangir	45.000	45,000	45,000
8	Boudh	47.000	47,000	47,000
9	Angul	14.000	14,000	14,000
10	Jajpur	12.000	12,000	12,000
11	Keonjhar	21.000	21,000	21,000
12	Angul	14.000	14,000	14,000
13	Lakh	14.000	14,000	14,000
14	Keonjhar	21.000	21,000	21,000
15	Keonjhar	21.000	21,000	21,000
16	Keonjhar	21.000	21,000	21,000
17	Keonjhar	21.000	21,000	21,000
18	Keonjhar	21.000	21,000	21,000
19	Keonjhar	21.000	21,000	21,000
20	Keonjhar	21.000	21,000	21,000
21	Keonjhar	21.000	21,000	21,000
22	Keonjhar	21.000	21,000	21,000
23	Keonjhar	21.000	21,000	21,000
24	Keonjhar	21.000	21,000	21,000
25	Keonjhar	21.000	21,000	21,000
26	Keonjhar	21.000	21,000	21,000
27	Keonjhar	21.000	21,000	21,000
28	Keonjhar	21.000	21,000	21,000
29	Keonjhar	21.000	21,000	21,000
30	Keonjhar	21.000	21,000	21,000
31	Keonjhar	21.000	21,000	21,000
32	Keonjhar	21.000	21,000	21,000
33	Keonjhar	21.000	21,000	21,000
34	Keonjhar	21.000	21,000	21,000
35	Keonjhar	21.000	21,000	21,000
36	Keonjhar	21.000	21,000	21,000
37	Keonjhar	21.000	21,000	21,000
38	Keonjhar	21.000	21,000	21,000
39	Keonjhar	21.000	21,000	21,000
40	Keonjhar	21.000	21,000	21,000
41	Keonjhar	21.000	21,000	21,000
42	Keonjhar	21.000	21,000	21,000
43	Keonjhar	21.000	21,000	21,000
44	Keonjhar	21.000	21,000	21,000
45	Keonjhar	21.000	21,000	21,000
46	Keonjhar	21.000	21,000	21,000
47	Keonjhar	21.000	21,000	21,000
48	Keonjhar	21.000	21,000	21,000
49	Keonjhar	21.000	21,000	21,000
50	Keonjhar	21.000	21,000	21,000

HOUSING PROJECTIONS : 2050

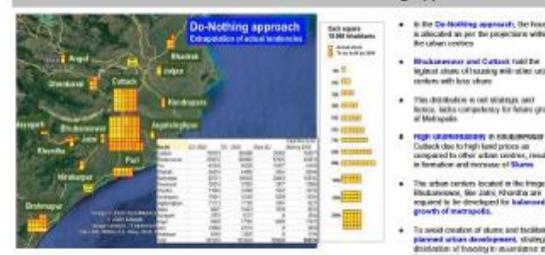
- Odisha metropolitan is slated to cross 1.9 million population in 30 years as to 4.6 million in 2050 (population projections based on the stated growth rates)
- The urban centers like Bhubaneswar, Cuttack and Puri are projected to have higher share of the population than the other centers
- The likely shift is going to be induced as a result of the urbanization social adaptation phenomenon
- It will require additional 0.0 Billion New dwellings by 2050



Land Required for Housing 1080 DU/Ha
By 2050 - 58800 Ha (140 sq km)
Land Required Annually - 480 Ha (3 sq km)

Urban	Population 2011	UR-2048 (P-2)	Population 2050	UR-2050 (P-5)	SLURMS 2050	Total City to be built
Bhubaneswar	4,28,914	1,78,120	5,28,914	2,64,000	16,300	1,13,217
Cuttack	502,226	303,226	2,12,700	408,000	17,000	458,122
Puri	2,29,981	60,348	2,29,981	88,238	16,000	1,14,586
Other 11 Urban Centers	1,98,873	1,98,873	1,74,448	37,179	41,000	27,177
Total	2,29,981	1,01,567	4,64,048	1,231,417	50,300	990,782

HOUSING DEMAND DISTRIBUTION- Do Nothing Approach



Do-Nothing approach
Extrapolation of actual densities

- In the Do-Nothing approach, the housing is allocated as per the population within the urban centers
- Bhubaneswar and Cuttack had the highest share of housing with other urban centers with less share
- The distribution is not strategic and hence, lacks conformity for future growth of Metropolis
- High urbanization in Bhubaneswar and Cuttack due to high land prices as compared to other urban centers, resulting in formation and increase of Slums
- The urban centers located in the fringe of Bhubaneswar like Jajpur, Keonjhar are expected to be developed for balanced growth of metropolis
- To avoid creation of slums and facilitate planned urban development, strategic distribution of housing is mandatory in the proposed transport network in scenario

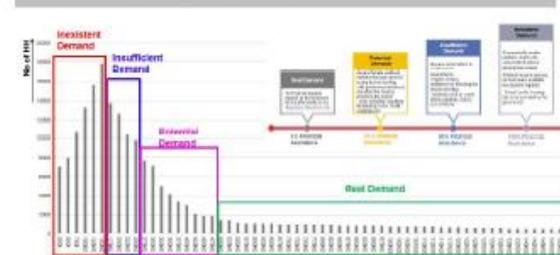
STRATEGIC APPROACH- Transit Oriented Development



Odisha Metropolis
1800 Housing Development Units Strategic Distribution - 1000 urbanization

- The proposed housing is in synergy with the transit oriented development model adopted for the growth of metropolis
- Dispersal of Bhubaneswar and Cuttack - 30% Growth, with other urban centers allowed to grow more
- The housing is being strategically located in accordance with the railway stations and commuter facilities proposed
- The land prices and housing prices in Bhubaneswar and Cuttack are bound to go higher and unaffordable for many
- Areas that are flood prone are being avoided for housing housing to go to reduce the vulnerability
- Now, housing is being proposed to newer urban centers like Jajpur, Khordha, Boudh etc

DEMAND STRUCTURING : Income Distribution



Income Distribution

- High Income
- Upper Middle Income
- Lower Middle Income
- Working Poor
- Unemployed
- Below Poverty Line

Demand Structuring

- Insufficient Demand
- Excess Demand
- Real Demand

FINANCIAL STRATEGIES

FINANCIAL ASSISTANCE : 2050
Total Projected Population of Metropolis by 2050 : 46,89,500
Total Dwelling Units to be built by 2050 : 8,92,784

Source Type	% of Total Demand	No. of Dwellings	Cost (₹)	Cost (USD)	% of Total Demand	Total Units	Total Cost (₹)	Total Cost (USD)
Resident	36.78%	3,26,511	1,60,000	840	100%	3,26,511	3,26,511	3,26,511
Investment	24.30%	2,14,989	1,00,000	4,900	10%	1,100	1,100	1,100
Potential	39.25%	3,51,284	1,80,000	9,000	10%	2,278	2,278	2,278
Total	100%	8,92,784	4,40,000	2,200	10%	0	0	0

ORISSA STATE BUDGET -2020-21

- Annual budget allocated for Water supply, Sanitation, Housing and UD - 11,337 Cr. (₹ 1,44,888 bn)
- ₹ 8 Cr has been allocated for PMAY urban - housing for urban poor (slums and LIG)
- Odisha State has to spend 188 million USD every year to address the housing policy within the state
- 10% of the State budget allocated for Water supply, Sanitation, Housing and UD
- State has to be responsible for holistic housing and infrastructure development of the metropolitan area

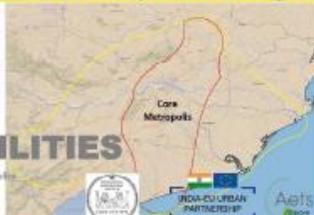
CONCLUSION

- Optimistic espousal of the proposed housing strategies will eradicate slums from Bhubaneswar in coming 30 Years by providing livable and adequate housing stock to residents
- Development of housing along the commuter routes and train facilities in a strategic approach will ensure balanced growth of the metropolis
- Integration of the metropolitan facilities like Transport, Environment etc with the Housing, is must to ensure strategic development of Bhubaneswar and ultimately, Odisha
- Sustainable metropolitan development of Bhubaneswar can be achieved by adopting the proposed housing finance strategies
- Housing proposal in the upcoming urban centers such as Jajpur will ensure affordable options to those working in Bhubaneswar and Cuttack
- Adoption of the proposed housing distribution and demand structuring will ensure resilient future of the Bhubaneswar Metropolis

Social Facilities

Mainstreaming Resilience in Metropolitan Planning

Supervisor: Dr. Pedro B. Ortiz
Team Members: Payal Dahi, Radhika Agarwal, Simayee Sabata
Fellow Team Lead: Kishmita Arora
Followers: Daniyal Hasan, Chuturka Babalola, Saloni Hillare



SOCIAL FACILITIES

Enriching the Social Fabric of Metropolitan
201216 Bhubaneswar

Project title: Enriching the Social Fabric of Bhubaneswar Metropolitan Region

Key Features of Project

- To identify the gaps in existing facilities and promote Balanced distribution of High Order Educational & Medical facilities.
- To promote Mix Land Use based social facilities in the extra free land available around proposed TOD's
- To deepen the communal fabric of region in two phases
 - Concentrating Facilities across the Core Metropolitan Region
 - Dispersing Facilities across the Extended Metropolitan Region.



Sector Situation - Educational Facilities - Key Issues & Quantified Solutions

- Concentrated Distribution**
No Higher Order Institutions in Extended Metropolitan Region. Need for De-concentration
- Disseminated Educational Islands**
Poor Continuity in Accessibility to Educational Nodes. Need for filling gaps through Efficient Transit Network
- Inherence in Contiguity of Facilities**
Diversity in nature of districts impact the existence of facility. Need for Identifying secondary districts in region
- Peer Accessibility**
Landed access nodes leads to Concentration along Major Transit Junctions

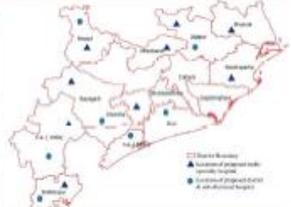


	Professional Educational Institute	General Educational Institute
Population in 2006	27,07,096	27,07,096
Existing in 2006	006	10
Required acc. Capacity	9	21
Gap	More than Required	9
Population in 2017	46,06,004	46,06,004
Requirement	15	37

Objective - Balancing the GAP
Outcome - Upgrading Low Order Districts to Scholastic Completeness

Sector Situation - Medical Facilities - Key Issues & Quantified Approach

- Non-Uniform Distribution**
Limited Specialty Hospitals in Extended Metropolitan Region. Need for Balanced Distribution
- Linked Approach to Serving Area**
Expected Maturity of Facility. Need to improve serving area of facilities
- Connectivity & Peer Accessibility**
Districts with High Order Connectivity - High Accessibility. Should be vice-versa (necessity, feasibility, coverage, proximity)
- Constraints from Terrain**
Congested Terrain leads to Scattered Sub-centers. Limited Access to Medical Facilities



	Multi-specialty Hospital	Digital and Sub-specialty Hospital
Population in 2006	27,07,096	27,07,096
Existing in 2006	8	23
Required acc. Capacity	21	18
Gap	13	More than Required
Population in 2017	46,06,004	46,06,004
Requirement	46	16

Objective - Improving Overall Access to Medical Facilities
Outcome - Integration of Medical facilities along Major Transit Corridors

Sector Situation - Sports Facilities - Key Issues & Quantified Solutions



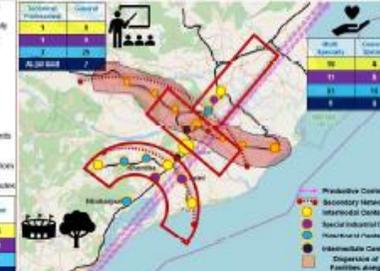
- Concentration of International Level Stadiums**
Barabati Stadium - Cuttack, Kalinga Stadium - Bhubaneswar. Need for Dispersal Approach
- Secondary Recreational Facilities**
Hockey Stadium, Badminton Courts, Football Practice. Connecting these with proposed transit corridors
- Abundance of National Parks around the Region**
Outer metropolitan region can be used to promote national parks & wildlife sanctuaries. Need to use National Reserves as Social Quality Enhancing tools.

	National Park	Stadium
Cuttack	1	2
Bhubaneswar	3	6
Dei	8	4
Shankar	8	2
Shankar	1	2
Shreeji	1	1
Seesthree	0	1

Integrated Proposal & Sector Quantified Solutions

Project Proposal: knitting Social Fabric

Objective: a) To promote Balanced supply b) To Enrich Quality of life by increasing approachability to services



	2006 Facility	2017 Requirement
Secondary	2.8	10.15
Social Industrial	3.5	11.29
Intermediate	6	21.5
Intermediate	2.4	8.4

Project Development & Phasing

Parameters for Proposals:

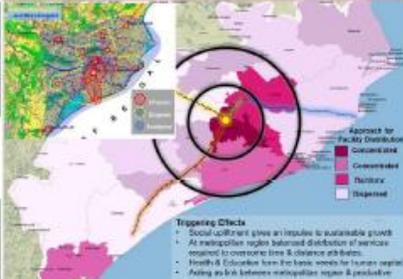
- Accessibility - Road/Rail
- Proposed TOD Modes
- Terrain
- % of Population engaged in Educational facilities
- Concentration Pattern of Neighbors
- Existing Distribution of social facilities

Project Benefits:

- Triggering social sector uplifts the overall growth of population.
- Add life to urban population

Project Phasing:

- Phase 1: Focusing on Core - Concentration of facilities
- Phase 2: focused on Outer Ring - Dispersal Activity



Approach for Facility Distribution:

- Concentrated
- Concentrated
- Dispersed
- Dispersed

Triggering Effects:

- Social upliftment gives an impulse to sustainable growth
- As metropolitan region balanced distribution of services required to overcome time & distance obstacles.
- Health & Education form the basic needs for human capital.
- Adding an link between metropolitan region & peripheral social development.

Productive Activities

Mainstreaming Resilience in Metropolitan Planning

List of participants:
Town Leader
Bhawendra Khatua
A. Prady Prasad
Sudhakar Kumar
Sudhakar Pattnaik
Bhubaneswar Smart City Jobs
Habitat Appraisal
Srinivasan
Prady Debi

Sector: Productive Activities
Productive Utilization and Employment generation

201216 Bhubaneswar

DIFFERENT PRODUCTIVE ACTIVITIES

Gross District Domestic Product (GDDP), 2011-12

Sector	Top Five Districts		Share of the District to total 2011-12
	District	GDDP (Rs. in Lacs)	
TOTAL	Surgajyoti	1351473	5.72
	Bhubika	988338	7.68
	Cuttack	954383	7.94
	Cuttack	947293	7.78
	Bawal	539338	7.07

	2011	2016
POPULATION	33,29,027	38,49,769
WORKING POPULATION	5,05,883	6,33,388
EMPLOYMENT GENERATED	243678	733357

ECONOMIC ZONE

ANNUAL GDP (IN LACS)

DISTRIBUTION OF PRODUCTIVE ZONES IN INDIA

ANNUAL ECONOMIC ZONE

PER CAPITA GDP (IN Rs.)

Integration of Productive Sector within the other sectors of the Metropolitan Structure

Bhubaneswar Metro-Structure

Investment Regions:

- National Investment and Manufacturing Zone at Balingiraj
- Petroleum, Chemicals and Petrochemicals Transient Region (PCTRT) of Balingiraj
- Port based industries in region of Dharma

Upcoming Industrial Cities/Towns:

- Bhubaneswar Corridor to the south
- Push to the south
- Suburban to the North
- Talukh-Argal to the West
- Industrial to the West
- Parallel to the coast
- Dharma Chaudhali to the NE
- Alachal to the North

BHUBANESWAR URBAN CENTRALITIES

PRODUCTIVE CENTRALITY
Tertiary sector and maritime Logistics
Along the NODE 2 of CGC to support the import and manufacturing of Argal and Parsip

PRODUCTIVE CENTRALITY
Main innovative HUB and AIRPORT CITY
An urban tertiary centre acting as a balance to the extreme gentrification that emerges.

URBAN CENTRALITY
Jain and Khurda research and Development hub
Area servicing the industrial and education research nodes of Jain and Khurda focusing on Indian internal markets and export to export products.

Industrial Corridor on the national freeway

- Direct access to Airport and port for base economy exports
- Direct access to National markets by train and road

DESIGN LAYOUT OF INDUSTRIAL PARKS BY NATIONAL HIGHWAY

The two key directions for the Industrial Development:

- Directionality A:** At the Small Scale to Heavy industries Corridor along the National Highway 5 towards South upto Odisha Port.
- Directionality B:** IT, Medium scale and educational institutions along the NH 224 Towards Mangalgi.

	2011	2016
Registered industrial units	17112	22800
Total industrial units	14,253	18,900
Registered medium & large scale	86	116
Employment generated in large scale industries	198819	484,000
Employment generated in large scale industries	18620	55330
No. of industrial area	38	58
Employment generated from IT centres	14000	220000

LAND AREA REQUIREMENTS

Category	2011	2016
Large scale	340	400
Medium	18	22
IT sector	100	140

Proposed Industrial Zones

- Medium Scale
- Heavy Industries
- IT Townships
- Shipyard Port/Petroleum
- IT Hub/IT Employment
- Small Scale/Medium Scale Industries

Odisha International Freight Airport

AAI has not spelt out investment plans for the proposed airport. There is a possibility of developing it on the PPP mode.

	2011	2016
DOMESTIC AIRCRAFT MOVEMENT (P.O.S)	21,332	30,517
INTERNATIONAL AIRCRAFT MOVEMENT (P.O.S)	621	1500
PASSENGERS - AIR	3200	24,72,268
CARGO (in TONNAGE)	201	1500

Location: Tangiparika, Mahabadi and Bhubani

Land Area: 300 Hectares

Project Cost: 1800 crore

Employment: 4000 jobs

Total Passenger peak hour: 3000

Total MTR: Passenger (peak hour) 3000

All passenger aircraft for 240 TRP total passenger hour 1800000

Passenger load 1800000

Average air traffic/Passenger/day 34,200

ODISHA INTERNATIONAL PORT CITY

Readily Port handles various cargoes such as iron ore, thermal coal, oil, steel, cement, sugar and containers.

Location: Puri

Land area: 1000 hectares

Project Cost: 1500 crore

Employment: 1000 jobs

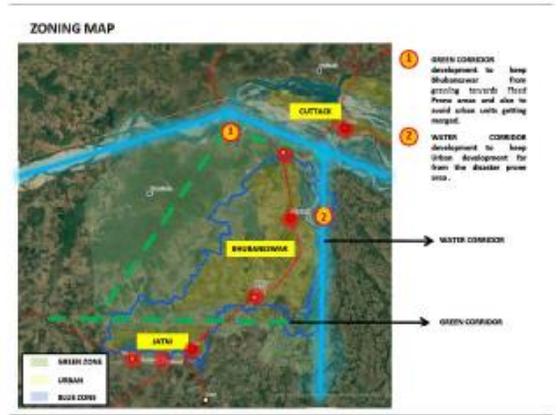
Annual cargo capacity: 100,50,000 MT

	2011	2016
Container	11	200.1
Storage space of container	1.8	21.2
Container space - 20TE	14.3	25.7
Cost with Social capital	15.3	1.4
Cost container	30	54.8
Investment	15.3	371
Total land area required	1116.68	739.88

Note: An estimate prepared for 10 to 15 years of growth and hence there is need to provide at least double the area than the area requirement estimated for the year 2011.



Thank You...



THANK YOU

Strategic Guidance and Roadmap – Mr. Pedro B. Ortiz

Mainstreaming Resilience in Metropolitan Planning

Integrated Structural Plan approach

Odisha Metropolis Harnessing expansion

201216 Pedro B. Ortiz

Metropolitan structure

- Main Coastal directionality
- Secondary inland directionality

Structural Pattern of development in accordance with Metropolitan DMA

Bhubaneswar Metro-Structure

- Population Distribution in Bhubaneswar Metropolis
- Main Metropolitan Transport service
- Secondary Metropolitan Transport services
- National East Coast Super-Highway
- Productive corridor Industrial - Logistic - Tertiary Base Economy
- Higher Green Infrastructure
- Metropolitan Coastal Plan

Environmental protection and enhancement Strategy

Strategic Policies:

- Forest protection
- Hill fauna habitat
- Rivers and waterheds
- Coastal protection
- Sea level rise prevention
- Flood areas prevention
- Natural Green corridors
- Metropolitan and urban

Google Earth

Do-Nothing approach Extrapolation of actual tendencies

Each square 10,000 inhabitants

Actual urban To be built by 2050

Effects:

- Congestion & gridlock
- Land prices
- Supply insufficiency
- Housing prices
- Affordability stress
- Skills mismatch
- Skills education
- Skills promotion
- Lack of mobility
- Perennial Soc. Pac. Inaccessible Soc. Pac.
- Labour contracts
- Productivity crisis
- Competitiveness
- Underdevelopment
- Unsustainability
- Environment invasion
- Risk prone location
- Hazards & disasters

Housing strategic distribution

- Based on mass public transport TOD Development
- Environmental protection and Green infrastructure integration
- Financial sustainability

Benefits:

- Mobility
- Decongestion
- Land price reduction
- Housing supply capacity
- Reduction of housing prices
- Affordability
- Social Facilities integration
- Labour market accessibility
- Productivity inputs
- International Competitiveness
- Development
- Environmental land protection
- Environmental integration
- Urban rural linkages
- Risk reduction
- Disaster prevention

Demand Typologies

- Real demand: Real estate for rent, highly required
- Potential demand: Real estate with utility help
- Unreal demand: Real estate luxury
- Unreal demand: Real estate luxury

	Cost of 1	Cost of 1	Cost of 1
	Million USD	Million USD	Million USD
RESIDENTIAL	107,941	10,794	100,000
INDUSTRIAL	280,714	28,071	1,000,000
POTENTIAL	1,862,919	186,292	1,000,000
REAL	143,993	14,399	1,000,000

Per 2050: 4,000 Million USD Per Year: 1,000 Million USD

Timing The Phasing of the Metropolis

First Phase (3 years):

- Commuter extension to Cutack - Bhubaneswar Commuter service
- New and better roads (1.2 to 2.000 meters)
- 5 intermediate TOD's (land for 75,000 housing)
- Intervol environmental protection
- Social Facilities for land development on TOD's
- Housing development, affordability near

Second phase (7 years):

- Commuter extension to Jales and Tengi
- National Highway in service
- Airport approval and projects
- Research and Development resources and projects
- Airport renewal and project
- Economic Central bus revenue and projects
- 5 extra TOD extensions (125,000 Housing land)
- Waterheds extraction and disaster prevention
- Social Facilities extra free land on TOD's

Third Phase (10 years):

- Commuter extension to Puri
- Airport approval and projects
- Airport city land zoning development
- Industrial parks under construction
- Social Facilities extra free land on TOD's
- Brownfield regeneration for new provisions



Many thanks to all the participants involved in this collective effort, and responsible for the outcome proposal



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