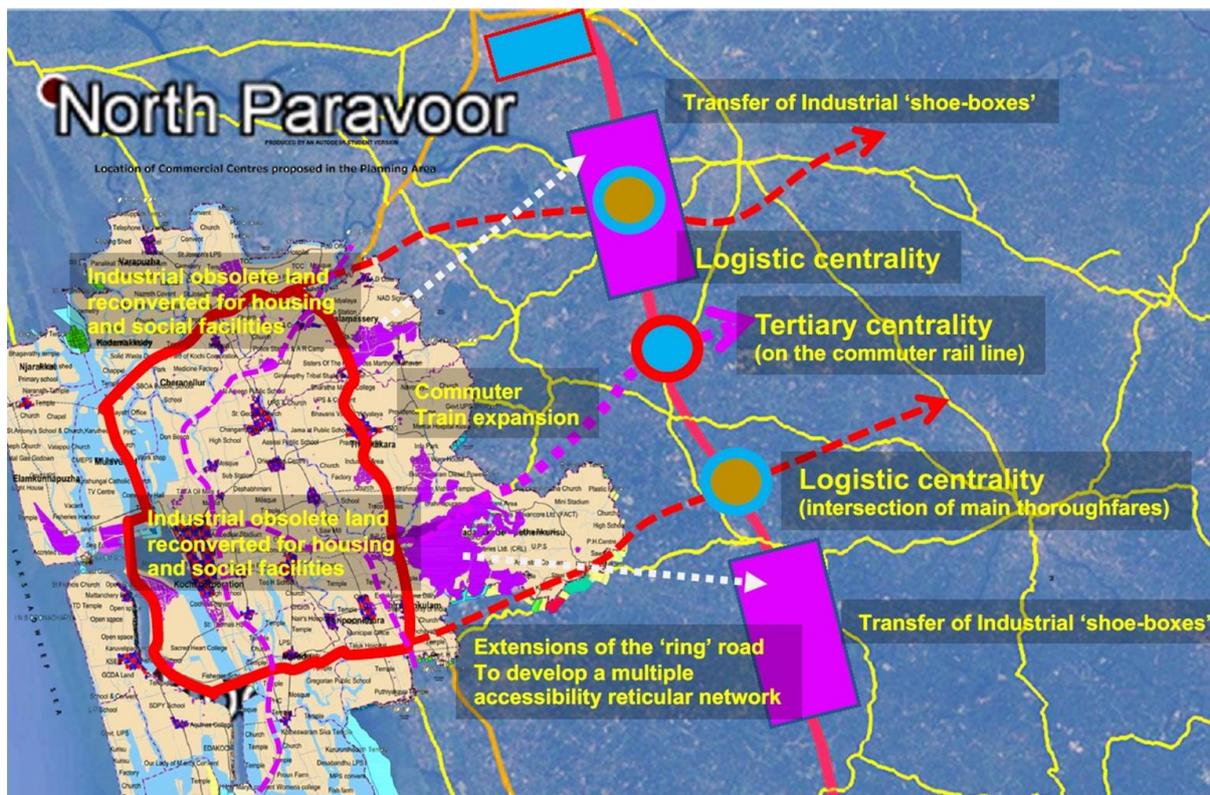




INDIA-EU URBAN
PARTNERSHIP



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

August 2020

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

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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 (Kochi weblab)

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This project is funded by the European Union



and implemented by AETS



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II. Abbreviations

AGM	Assistant General Manager
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ASHA	Accredited Social Health Activist
C-HED	The Centre for Heritage, Environment and Development
CREDAI	The Confederation of Real Estate Developers' Association of India
CSML	Cochin Smart Mission Limited
EU	The European Union
EUD	The Delegation of European Union to India and Bhutan
GCDA	Greater Cochin Development Authority
GDP	Gross Domestic Product
GFA	Gesellschaft für Agrarprojekte in Übersee
Ha.	Hectare
ICLEI	Local Governments for Sustainability
IEUP	India-EU Urban Partnership
IMA	Indian Medical Association
IUC	Intermodal Urban Centrality
KMC	Kochi Municipal Corporation
KMRL	Kochi Metro Rail Limited
NMT	Non-Motorised Transport
NUHM	National Urban Health Mission
PMAY	Pradhan Mantri Awas Yojana
SNKE	Senior Non-Key Expert
TOD	Transit Oriented Development
UMTC	Urban Mass Transit Company Limited
UPAD	Urban Poverty Alleviation Department
WRI	World Resources Institute

III. Introduction

The India-EU Urban Partnership Programme (IEUP) aims at contributing to strengthening the EU's 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 Indian cities over the 3 years of the programme (2020-2023). The first such Lab was conducted with the city of Kochi in a virtual mode (weblab) in view of the prevailing COVID-19 pandemic restrictions.

The objective of the online Metropolitan Planning Lab was to provide new insights and support the city of Kochi and its larger metropolitan area in resilient master planning in the post COVID era. Kerala was one of the first Indian states to be impacted of the COVID-19 crisis. Although, the state managed the crisis very well, it needs to be prepared for any such future unexpected shocks, by mainstreaming resilience in its urban planning process.

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

IV. Technical Report on Web Lab

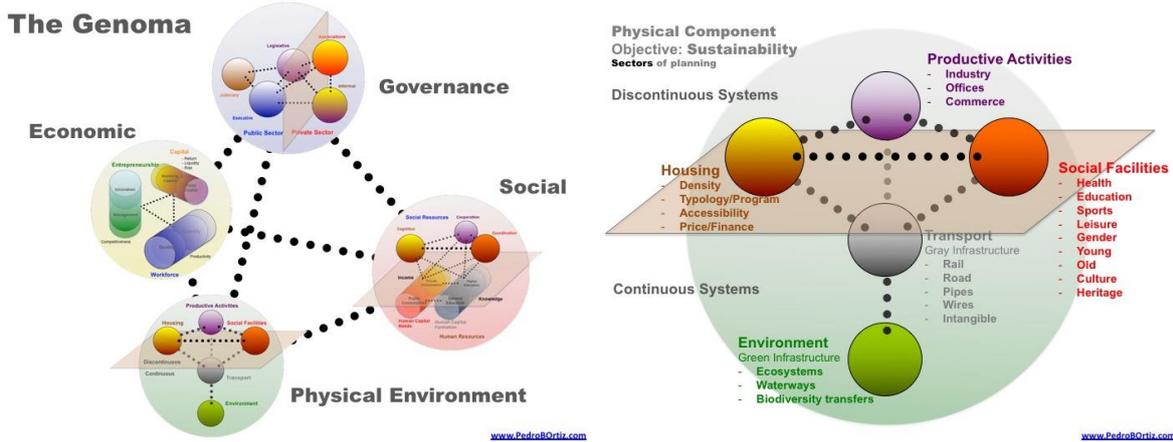
Kochi Metropolitan Workshop methodology and objectives

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. Metropolises should therefore be managed at highest efficiency and social equity, within a framework of long-term sustainability, security, and resilience. However, these elements are often lacking in metropolitan management.

The complexities in metropolises makes them function more like countries rather than cities. Their genomic components are not only transport, environment or housing but also include issues such as social resources, economic productivity, legislative frameworks. These aspects supersede the mandate of any city's local administration, that aim to address infrastructure and services provision.

a) Metropolitan management: Components and Sectors

Metropolises have 4 components: Economic, Social, Physical, and Institutional. Economy seeks 'efficiency'; Social seeks 'equity'; Physical seeks 'sustainability', and Institutional Governance seek 'equilibrium'. These components are often in tension and competing for limited resources with Economy needing 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 Components

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.

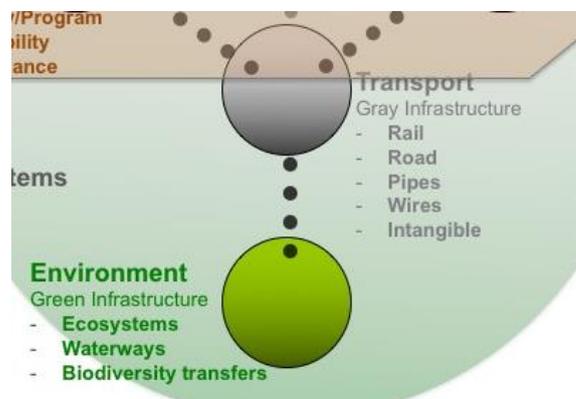
The Strategic discussion is too complex to be dealt in a Metropolitan Web Lab since it involves the discussion of the many elements of the integral Metropolitan Genoma. It is for this reason that the Kochi Metropolitan Web Lab focused on just the Physical Components and its sectors.

c) Workshop expected results.

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

a. Specific Sectors' development that the Web Lab focused on are:

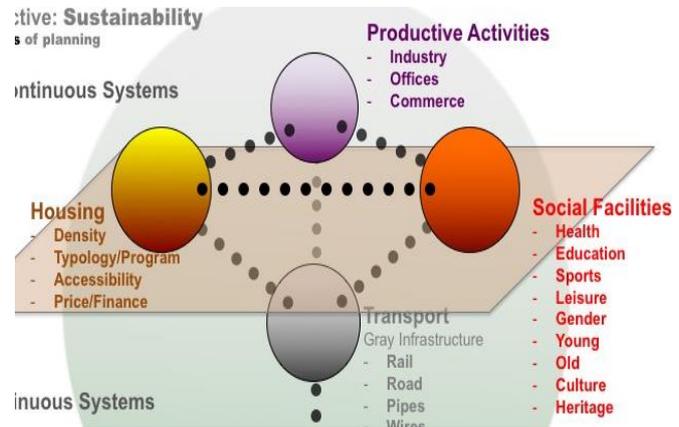
- **Environment:** The given capital that must be preserved and enhanced. The solid ground upon which wealth an equity must be developed preserving its integral capital and benefiting just from the dividends. Quality environment has not only to be protected and preserved, but also be enhanced and improved. 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 corporation.

- **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.



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

- **Social Facilities:** The large array of social needs such as Education, Health, Care to social groups, Leisure, Sports that are essential for the quality of life for the population that define a developed society. Services and facilities that were unthinkable some centuries or decades ago are now at the very core of the definition of an equitable society. By 2050 Metropolitan Kochi should have reached that level. While it is a long-time horizon, a start must be made now with this Metropolitan snapshot Structural Plan.

b. Integration in time, scales, and sectors

The workshop aimed at producing an integrated vision for Metropolitan Kochi 2050. This vision aims at benefiting the metropolis and its parts: the municipalities. If the Metropolis performs well in economic, social, and institutional terms it will be because the physical territory, is well designed. 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. Kochi is today a USD 3.000/Capita Metropolis, it should aim to reach USD 20.000/Capita.

Kochi Metropolitan structural analysis

1. What does Kochi want to be in 2050?

One of the first things that is imperative for metropolitan planning is defining the vision. What is the role it wants to take in the global concerto of metropolises: 'What it wants to be when it will grow up?' That is the objective to be defined by a strategic plan, before the structural one. Since this weblab focuses on the structural plan only, we assume that a vision has been defined and the authorities in Kochi knows what it wants to be 30 years from now.

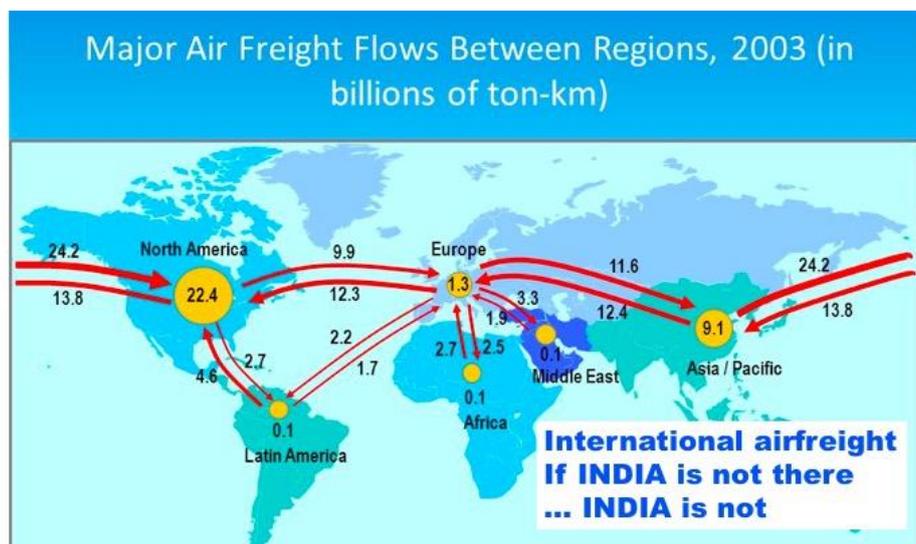
That objective must be ambitious, but reasonable and attainable. In the case of Kochi, it must be related to its location advantage in relation to the global sea trade routes. That was so in Roman/Ashok times when both Kochi and Rome where linked by Jewish trade ships pushed by monsoon winds to and from the Red Sea and Koptos city in Egypt. 2000 years later, the trade route has extended from Shanghai to New York - the sea highway of the world and Kochi has a strategic location along that route, but is

not making the best of it. To prove so we bring the port image of a similar location advantage along that route, the Port of Valencia, where the size and extension is 10 times larger and Kochi can do better.



Valencia and Kochi ports along global sea trade routes (the yellow bar provides the scale of a ship)

If we look at airfreight an even worse picture strikes the eye. In world air trade routes India does not exist. This shows that India exports goods that are heavy-weight / low-value and those are the goods that take the ship and, the ones that are low-weight / high-value take the plane. The low-weight / high value are the products of developed sophisticated economies - the ones that add real value to their products and are the wealthiest in the world. If Kochi wants to join what the world calls metropolises, it must push for low weight / high value goods exports (base economy) and such goods normally use air freight. Kochi must provide airport freight services, expand its facilities, and even think of a second freight bound airport. The actual relation of passengers (9 m) to freight (72,000 tons) proves the low ratio. Madrid in 1992 was doing 9 million passengers and 300,000 tons freight and was doing very badly; Amsterdam was doing 9 million passengers and 4 million tons freight.



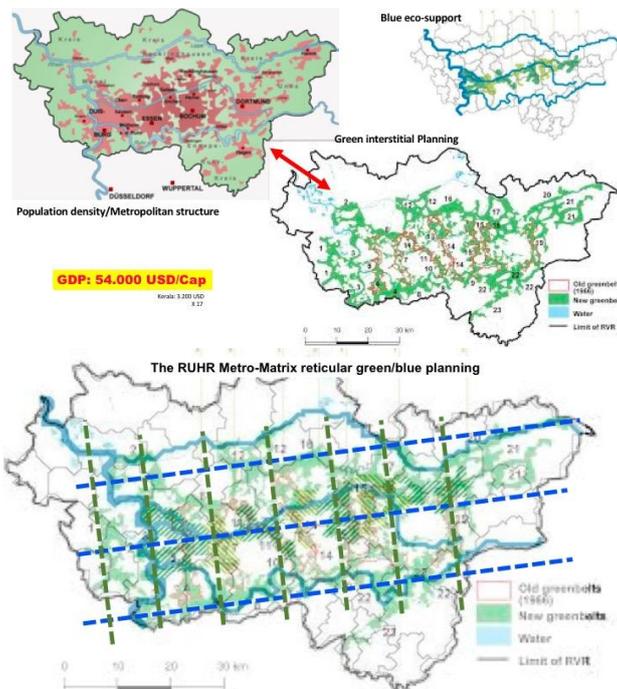
India, inexistent in global air trade

Kochi must thus build up an industrial complex that will directly link the industrial zone to the international freight airport; a 'Garuda' Industrial Corridor, outside the city to avoid interference of road heavy traffic. This new industrial land can attract industries located in obsolete urban locations and provide the chance for regeneration and provision of social facilities central locations, parks, and housing. The value addition of the regeneration of derelict industrial areas will largely pay for the re-development of the assets.

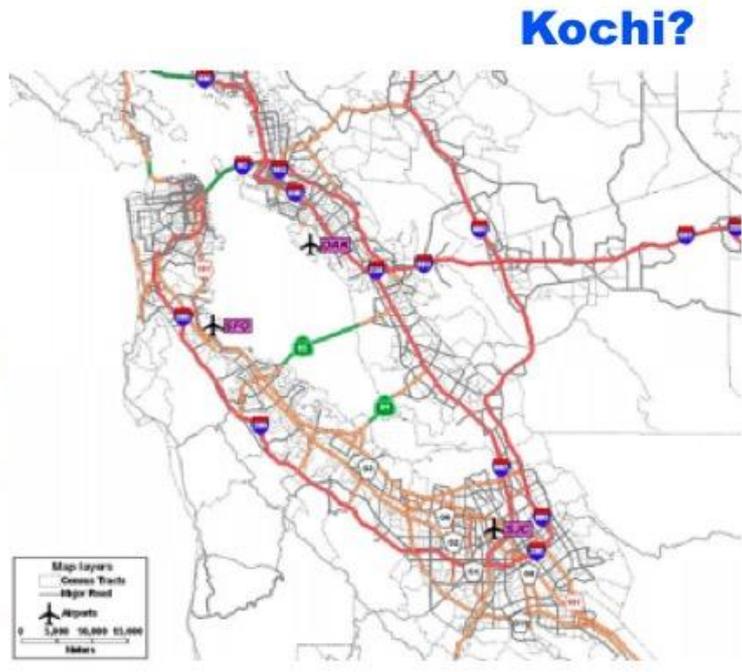
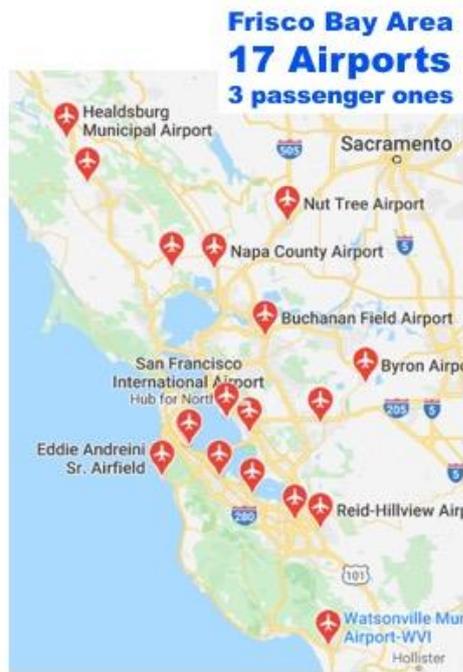
2. Kochi, not so peculiar.

Kochi likes to stress that they are different, unique and that it's metropolitan structure is a necklace of medium size metropolises working together instead of mega metropolises like Mumbai or Hyderabad; that it's urban settlement typology is an urban rural continuum different from the rest of India.

There are examples of regions with characteristics like Kochi. The rur-urban settlement pattern is seen on the Caribbean islands where these characteristics have led to inefficient, inequitable, unsustainable development with an economic outcome of USD 3,000/Capita. However, there could well be a causality phenomenon there and thus, a reason to avoid such chaotic urban development. The Ruhr valley in Germany presents an example of an integrated necklace of metropolis. The Ruhr Valley is the most productive industrial complex in Germany and probably of the world along with Mega-York and Frisco-Angeles. The GDP of these areas are in the range of USD 60,000/Capita. Taking inspiration from what has worked in these regions, Kerala could consider following a similar approach. The topography of Kerala, a long stretch of sea plane separated from the interior plateau by a ridge of mountains that provides the necessary water, can be found in many places that have learnt how to capitalize on these topographical constraints for their benefit.



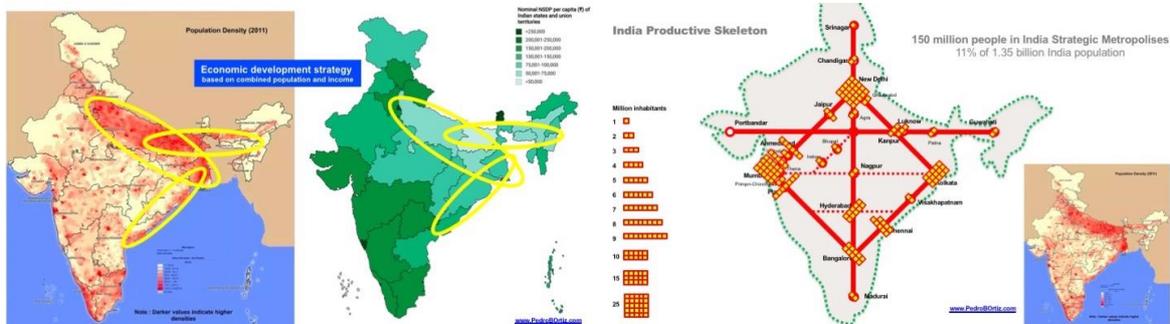
Ruhr's Valley metro structure (USD 54,000/Capita). Reticular green/gray network after Madrid's 1996 Metro Plan



Similar Bay structures between San Francisco and Kochi bays but with different productive outcomes

3. Socio-economic premises and institutional framework

A strategic approach in economic terms is being adopted and the enormous needs of the population of Kochi for health, social groups care and education, among others is being addressed. The assumption is that adequate institutions will be established to deal with these challenges and needs before 2050 and based on these strategic premises, the strategic approach to Mega Kochi needs for 2050.



Kerala privileged position in the Indian context. However, Kerala, a metropolitan system, does not exist

By virtue of its location on the western coast of India, Kochi is relatively well placed compared to the rest of the country. It has a high population density and good potential income, compared to the Ganges Valley and the East Coast. The high density can play an important role in achieving economies of scale that will boost productivity in economic and social provision terms.

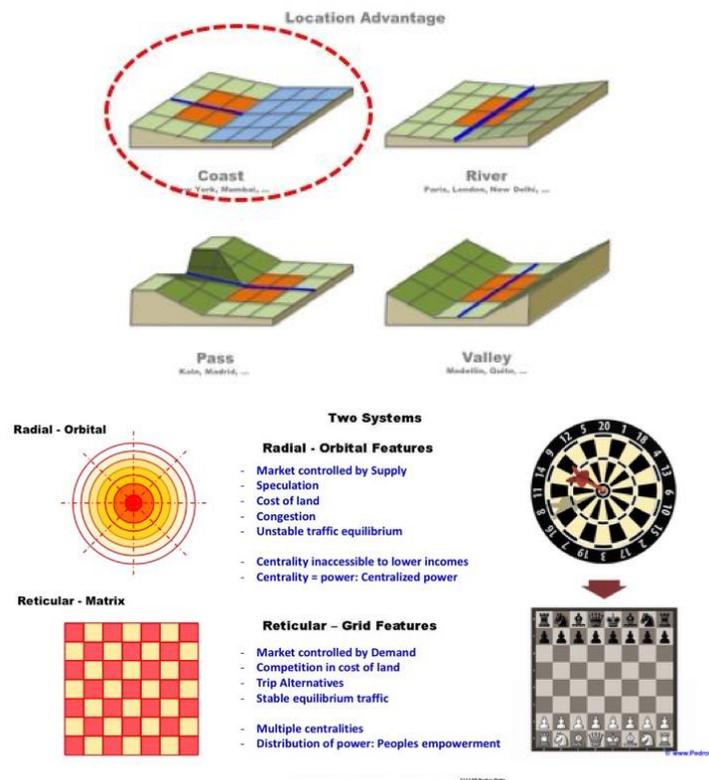
4. Kochi Topographical setting

As mentioned, Kochi is located on a seaplane, separated from the Indian Deccan Plateau by a ridge of Ghats that run along the Indian west 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.



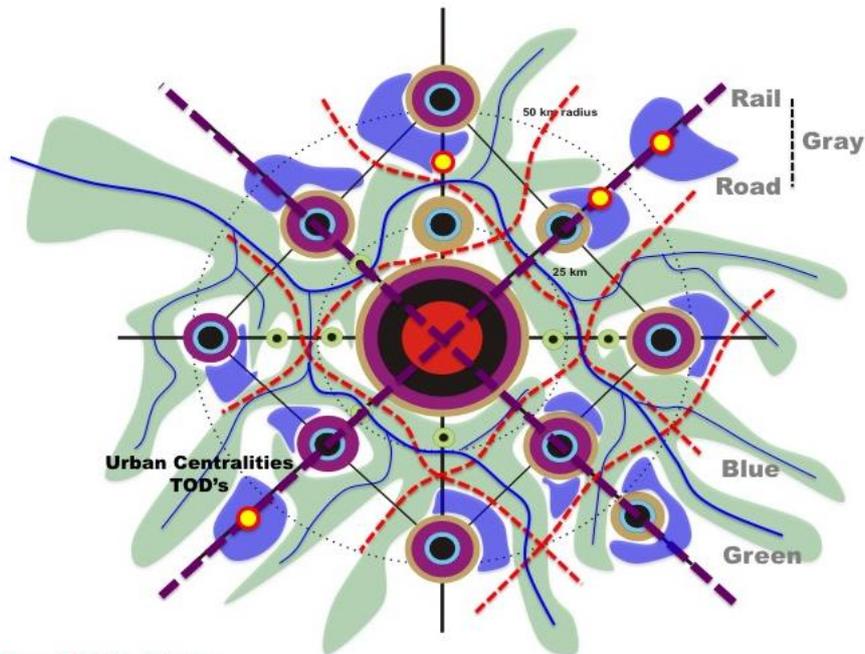
Kochi privileged geography sets up Metropolitan reticular directionalities: seacoast directrix and perpendicular river generatrix

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. Kochi metropolis belongs to the seacoast typology. The two directionalities, intrinsic to the metropolitan DNA, must be the structuring principle of Kochi metropolis, away from the radial-orbital model still most commonly implemented.



As is well established, the radial orbital model is congestive as it pushes activities and traffic to the centre. This congestion is a strong economic burden that for e.g. 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 centre 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 centre against the interests of the equilibrium of the whole and in detrimental of the periphery. The decision for the state government of Kerala here is whether their priority is Kochi Corporation against the benefits of the Metropolis of Kochi and the whole of the state.



Polycentric Structure

Source: www.pedroborliz.com

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

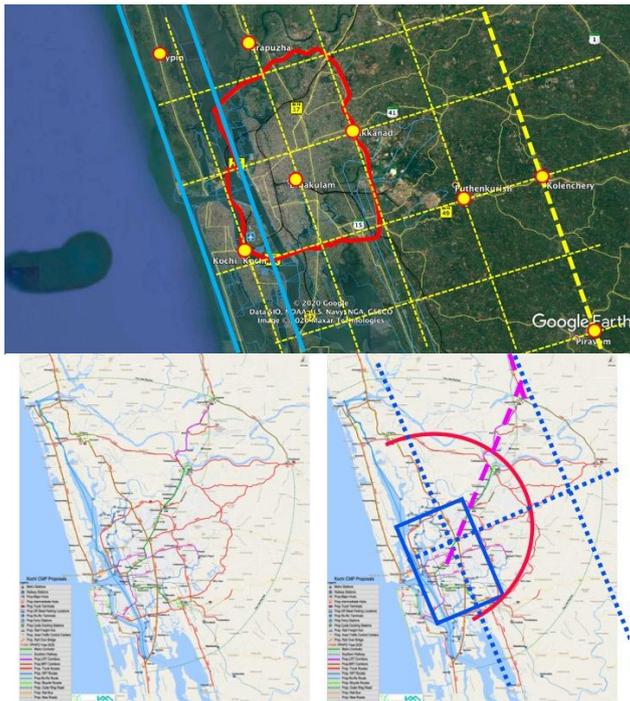
Metropolitan professionals globally have moved to a reticular model two decades ago. The reticular model provides homogenous accessibility, breaks down congestion since, for any trip the multiple routes dissolve in a natural way (stable-equilibrium phenomenon) congestive demand, land owners do not control 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 Kochi’s orbital model.



Efficiency comparative between Radial and reticular systems: From Monocentricity to Polycentricity. From Darts to Chess

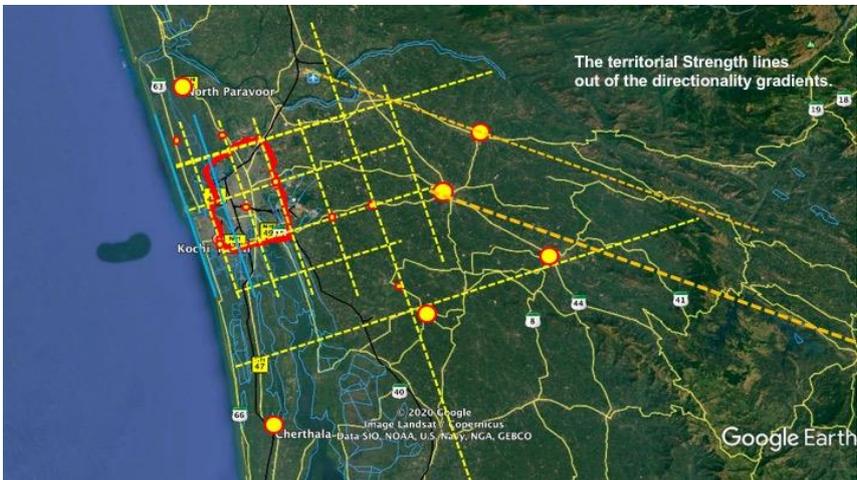
5. Kochi metropolitan structure development

Public recognition should be given to the transport professional that designed Kochi ‘Ring Road’. He understood the true nature of Kochi and designed a Ring Road which is not a ring i.e. it is not a circle rather, it is a square. The ‘Squared road’ has four sides forming a rectangle - two sides are parallel to the coast, called in reticular theory ‘inland gradients of intensity’, and two coast perpendicular ones, south and north of the conurbated centre. They reflect the directionality of the waterways from the Ghats to the Indian ocean. The genius demonstrated in the design of this road is somewhat diluted now with the metropolitan proposal for Kochi falling back on obsolete approaches that will have an enormous burden and cost on the future of Kochi.



The ‘Squared Road’ of Kochi, and the mislead actual attempts to force Kochi ‘contra natura’

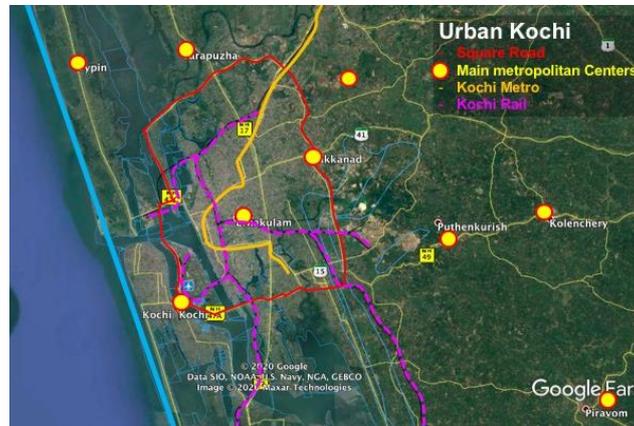
This reticular approach must be extended, intelligently understood by the Square Road to include the extended metropolis. This approach will explain the strength lines of the territory on which the metropolitan proposal can be built. This approach will reflect the true nature of the DNA of Kochi: the seacoast and the inland waterways to the ghats.



The strength lines of Kochi that reflect the natural DNA of the metropolis

6. The metropolitan dimension

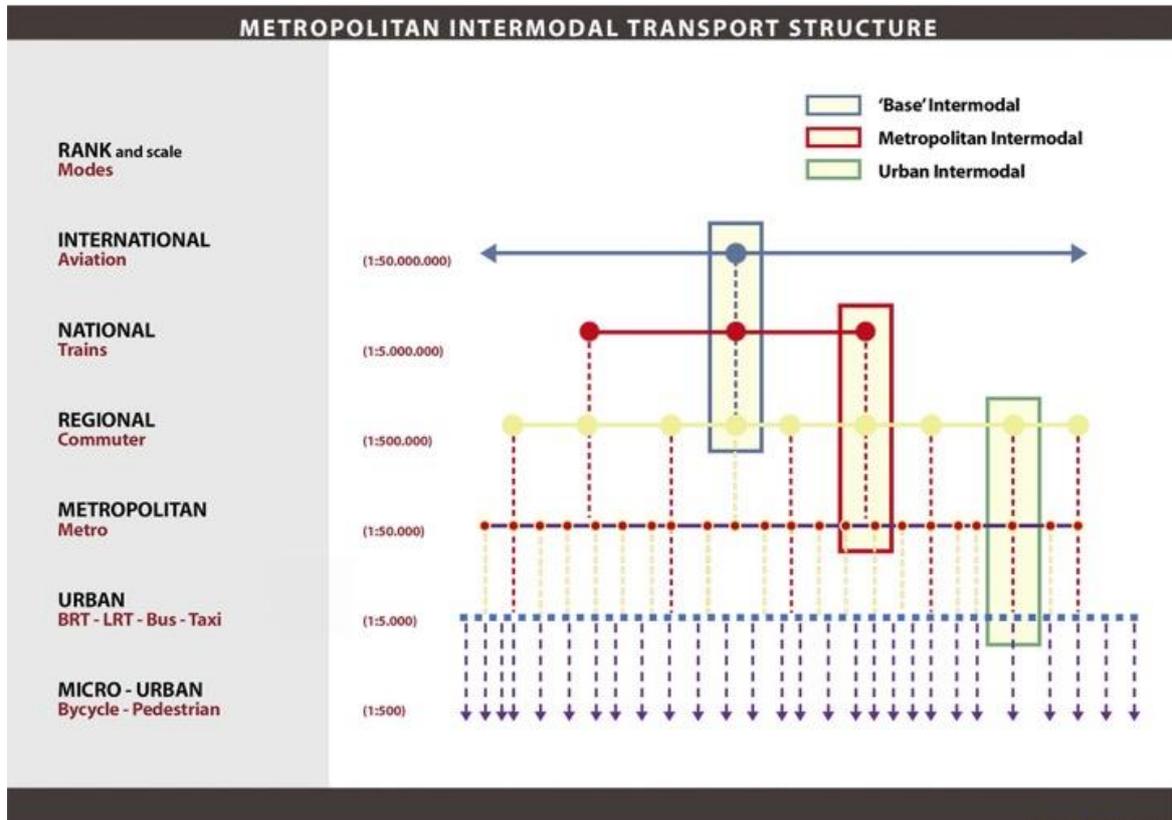
The actual infrastructure in Kochi are the assets - Metro, Commuter rail tracks and urban water-bus – and these are to be built on.



The assets of Kochi: Road, Metro, Waterbus, and Rail tracks

The urban assets are the Buses, the BRT's, and the Waterbus that provide the urban dimension to accessibility. But, any rides beyond 14 km rides takes 2 hours and this is not appropriate. The limit of daily urban transport service should not be beyond 1 hour distance. Metropolises that work worldwide have ratios of 30 to 40 minutes daily work ride. If the daily commute is more than one hour it means the metropolis does not work well. At this point, an appropriate quote is from the Romans, with whom Kochi was related: *'Justificatio non petita. Accusatio manifesta'* that translates to *'Tell me what you pretend you are and you will show to me what you are not'*. This applies to euphemisms in transport. If a waterbus is called a Water-Metro, it is because it is not a Metro. There are many ways of proving this. One would be the travel isocrones and the travel time for metropolitan distances (30 km). A Metropolitan Transport that does not reach the airport, an essential feature of the Metropolitan economy, is not a metropolitan transport - it is an urban one. So while the Kochi Metro is laudable, it is an urban transport and not metropolitan.

In terms of scales, bicycles are appropriate for the local dimension (1:500) rather than the urban one (1:5.000) – so bicycles may be exception at the 1:5.000 dimension but better suited for the neighborhood one. The Metro too is at the fringe between the urban and the metropolian scales (1/50.000). Metro stations are less than 1 km apart, this means that there is an urban continuum above or beneath. Covering metropolitan distances by the metro havenot worked. For example, Picadilly to Heathrow were once linked by the metro and took 1.30 hours to cover, in fact, longer than an air trip to Paris. London therefore build a Commuter line (the Heathrow Express) to overcome this flaw. Thus, the Metro can exceptionally be used for metropolitan trips, but is essentially an urban mode of transport.



www.pedrobertiz.com

Modes of transport have their right service scale. It is incorrect to use them at inappropriate scales. Integrating all modes of transport through intermodal stations (TOD's) is the right way to build a system.

The Commuter train is the most appropriate mode of metropolitan transport. This mode is complemented by the bus and metro feeding routes. Modes of transport do have dimensions. It is the transport system that integrates all the modes to fit each dimension. Using the wrong mode to fit the metropolitan dimension does not work so, using BRT routes for metropolitan distances is incorrect. The Ahmedabad 'flexible' road design might be a good example to follow in India, and good for urban thoroughfares, but it is not right for metropolitan projects and, Bogota has proved this fact 12 years ago. Bogota implemented the BRT and people were happy the first year as they experienced a new mode where there was none. However, they soon realized that they took 3 hours to reach their destination, and riots of discontent spread daily.



The Metropolitan Dimension of Mega-Kochi

Kochi metropolis does have a large asset of rail tracks and provide a good potential for a Commuter Train service. One track to the north, where the airport is to be expanded, and two tracks to the south, where the new freight airport is to be located. This way even both airports will be commuter linked. The full fledge service, well managed, could provide ridership to almost 800.000 passengers. This figure is to be compared to the actual metro ridership which is 65.000 passengers. A metropolis like Madrid, with 7 million inhabitants (a figure close to what Kochi metropolis is going to reach by 2050) and 5 Commuter lines, services more than a million passengers daily.

The missing train service is the inland-east line. It is too early to program for it before the other lines have entered service but, it can be planned. Location of housing urban centralities, metropolitan social facilities, and 'Directional Centres', can establish the prospect of building it in 15 years. Once built and serviced, the demand to make it financially viable will be there. Any other type of urban mode of transport instead of a Commuter train will produce an urban corridor instead of a necklace of Urban Centralities (TOD's). It will not only be inefficient (3 hours rides) but will also be unsustainable (environment segmentation). Urban modes of transport serving a continuous urban fabric, are urban, not metropolitan. The strength lines of Kochi Metropolis with the existing and corresponding actual roads is shown below.

**KM5: Kochi Metropolis Metro-Matrix Mental Map,
Gray infrastructure Diagrammatic and Analogic reference**



Mega-Kochi Metropolitan gray (rail/road) structure, and corresponding existing network.

The Mega-Kochi Mental Map is shown below. This allows a picturization of the structure of Kochi and the elements which are missing as well as those that should be prioritized to make of Kochi an efficient and resilient metropolis.



7. Kochi Urban Centralities

The Commuter train can service all 17 Urban Centralities beyond the Kochi urban conurbation. Additionally, this will also account for the ones within the conurbation that in many cases could have a regeneration project, increasing densities and substituting obsolete land uses as offices for industries.

These projects should focus primarily on the intermodal stations between the Metro and Commuter services, where potential location of offices would make of them Metropolitan Service Centralities. Some of them can have an international strategy for international bound offices.

The 17 off Kochi conurbation centralities would be: **Chalakydy, Koratty, Karakutty, Airport City**, Puthenkurish, Kolenchery, Muvattupuzha, Enanalloor, Manjal, Thodupuzha, Karimannoor, Udambanoor, **Thalayolapurumbu, Ethumanoor, Chellanam, Cherthala**. The names in bold are centralities belonging to the existing rail tracks.

The urban nuclei that would have to be served by bus feeder routes would be: Kodakara, Trinjalakuda, Meloor, Ayyampuzha, Kodungallur, Puthenvelikara, Pallippuram, North Paravoor, Vypin, Varapuzha, Perumbavoor, Kothamangalam, Adivad, Piravom, Ramapura, Valikom. This list should be taken as a tentative one. The final decision should be taken within a full fledged Structural Plan after the required feasibility studies and land use potentials are determined.

The Urban Centralities are not uniform and each plays a role like the pieces in a chess game. They must have a combined common strategy, where each plays its role, to win the game - that is the role of the Metropolis.

- The most important one, the one to be protected, because if not the game ends, is **the King** - that is the historical Centre.
- But the most strategic and important piece to win the game is **the Queen** - that is the international umbilical cord: the airport and the port.
- The other centralities play roles according to their specialty creating clusters of activity that benefit from the economies of scale that makes an economy competitive - these are mainly **the Bishops**.
- **Rooks and Knights** have differentiated roles. Relevant urban subcentralities or service providers for their immediate hinterland of Pawns.
- A game can be won by a **Pawn**: Residential nuclei and villages - each of them is important



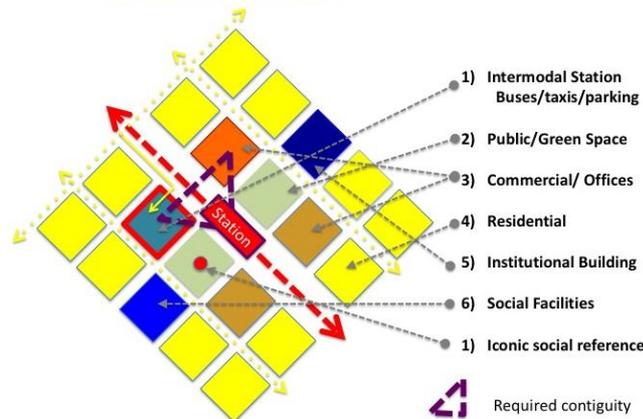
The Chess analogy tentatively applied to Mega-Kochi Metropolis

Apart from the chess analogy, a distinction must be made between the ones that play a residential role and must have the very basic services and the ones that play a more specific role (International, Metropolitan, Business, Cultural, Health, etc.) and have a larger share of the items that allow them to play that role at their best.

Urban Centrality (TOD) typologies



The Centrality Stereotype



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

Urban Centralities must have 7 elements. These elements must be present in any Centrality, but not necessary 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.

8. Land requirements

Environment and Transport are the two continuous systems out of the 5 sectors. They are networks that feed the other 3. Environment provides quality of life and transport provides accessibility and connectivity for the discontinuous sectors to work. The Discontinuous ones - Housing, Social Facilities and Productive Activities are the land-use sectors, as defined in urban planning. The continuous ones are too, but they are public utilities mostly on public land, providing indivisible goods to land-use. Land-use sectors are divisible goods, and thus the core of the lucrative activities for the private sector capital investment.

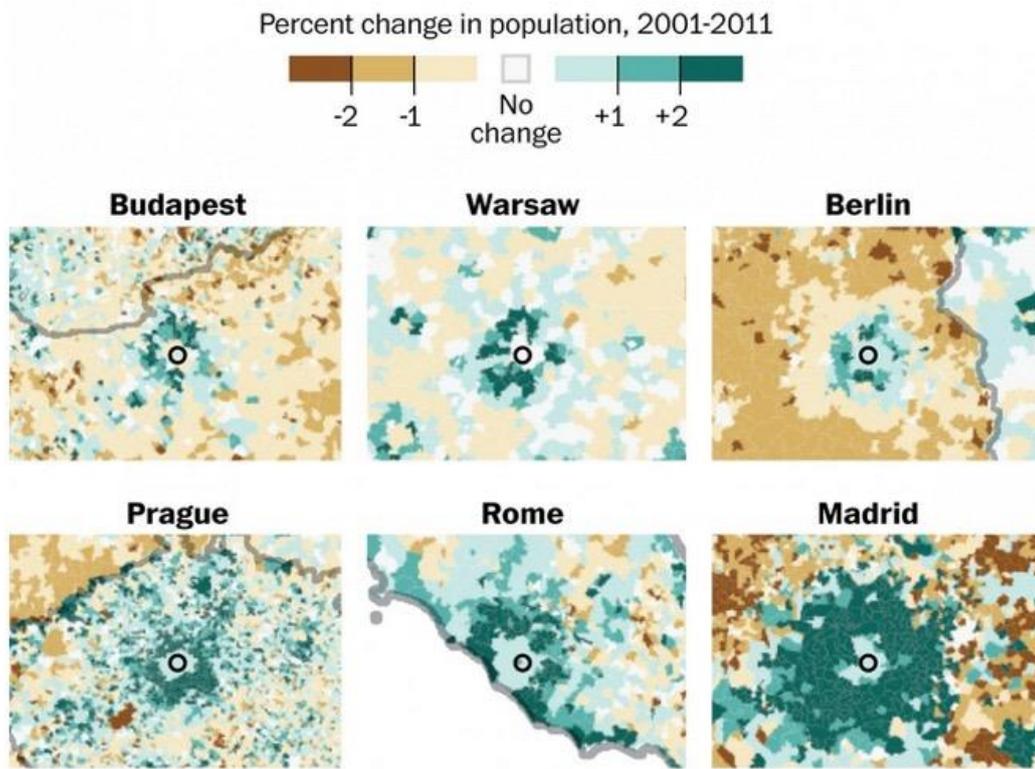
Housing and Productive Activities are two related activities that have to be integrated. Each of them has their own conditioning factors and they need to be apart to avoid incompatibilities (pollution, risk, heavy load traffic, etc.) but well-connected transport can reduce the daily time to work. Social facilities on the other hand, must be as accessible as possible to housing. Small land consuming facilities have to be at the urban centralities, large land consuming ones can interface with the green infrastructure due to compatibility and synergy reinforcement.

9. Housing

Housing is the key land consuming sector. The population must be well housed with no deficits either quantitative or qualitative. The serviced land necessary for Kochi by 2050 depends more on the average size of the family than the absolute increase in population. Metropolitan population might grow, especially in developing countries where population is moving from rural areas to urban areas. At present, India is only 30% urban and when developed it will be 75% urban - this is a shift that cannot

be stopped since it is a cause and a consequence of development and linked to productivity. With increasing Productivity in agriculture, less work force is required due to capitalization and mechanization – this means that there is an increase in the workforce in cities due to higher productivity and income. This process of increasing workforce in cities linked to productivity cannot be denied and land requirements must take this into consideration rather than allowing the proliferation of slums.

To calculate metropolitan population growth, the full extent of the metropolis is to be considered i.e. its circumference till the end of the planning horizon. If just the centre of the metropolis, like in Kochi is considered, there will be depopulation, as people move to the periphery for larger and better living, running away from overcrowding – this was pointed out several times in the course of the Web Lab. All metropolises of the world are experiencing this depopulation.



Source: German Federal Office for Building and Regional Planning THE WASHINGTON POST

Metropolitan centres depopulating. Metropolitan periphery expanding at fast rate.

All metropolises in India are growing at an average pace of 5% which means that they double (100% growth) every 14 years. Some metropolises have higher average growth pace like 11% in Pune which means that growth will double every 7 years - a very serious task to address. The better the metropolis is performing the larger number of migrants it attracts. Kochi is not performing well as the immigration figures have only been 4% during the last decade and now, they are falling to 3% (UN).

With these concepts in mind the need for dwellings by 2050 is estimated. There are conflicting figures as the extent of the metropolis is not clear and the term is used in inconsistent ways. The first step is to determine the family size for the next 30 years. At the pace of reduction for the last 20, from 5.5 members/family to 4.5 members/family the size by 2050 will 3.7 members/family.

- Average Family size: 2001 census: 5.5 members/family
2011 Census: 5.0 members/family
- 30 years forecast: 2021 Census: 4.5 members/family
2031 Census: 4.1 members/family
2041 Census: 3.7 members/family
2051 Census: 3.4 members/family

From the different forecasted population growth, the most reliable estimation seems to be 6.4 million in 2050 from the actual 4.4 million- an increase of 50%.

Population and Housing statistics for Kochi Metro region

	2011		2020		2050	
	Households	Population	Households (4.5)	Population	Households (3.4)	Population
Kochi Urban Agglomeration	526,288	2,119,724	558,000	2,511,002	1,076,098	3,658,732
Ernakulam District	814,011	3,282,388	864,062	3,888,280	1,666,335	5,665,539
Kochi Metro Region	920,353	3,721,550	979,668	4,408,507	1,889,280	6,423,551

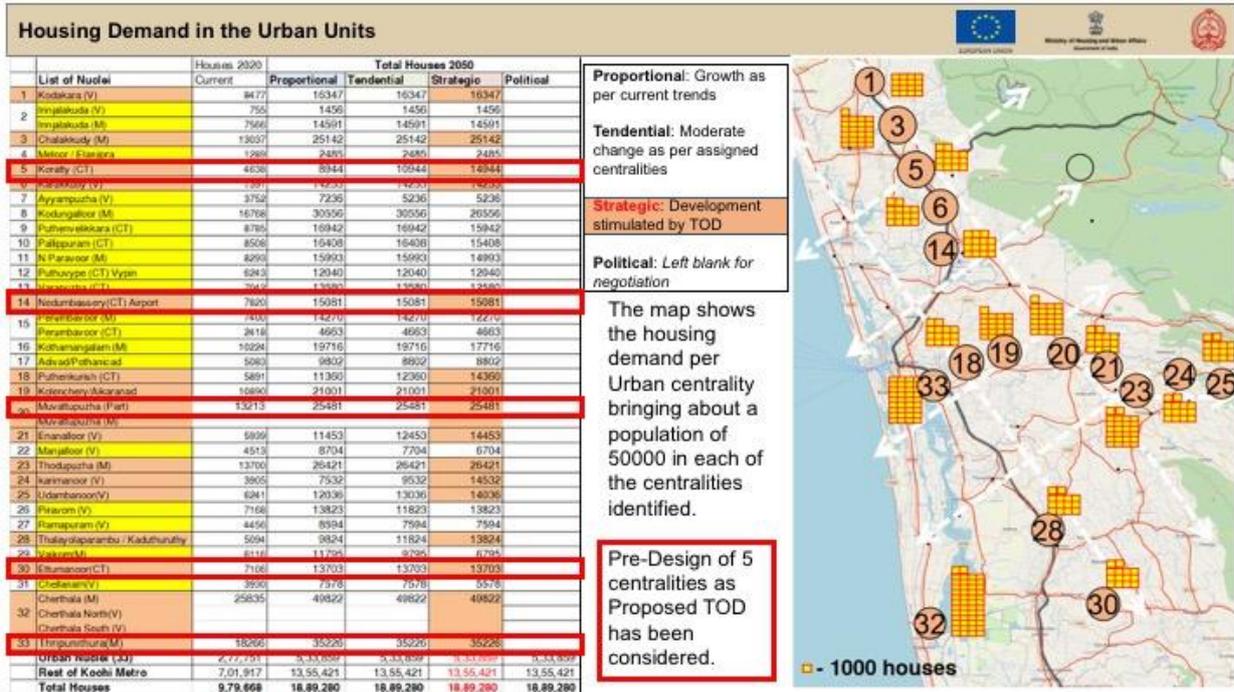
<p>Kochi Metro region Total Actual population: 3.72 million (2011)</p> <p>(at 1.9% annual growth rate)</p> <ul style="list-style-type: none"> Total Population in 2020: 4.4 million Total Population in 2050: 6,423,551 <p>Households and Dwellings</p> <ul style="list-style-type: none"> Total Actual families: 979,688 (2020) at HH size =4.5 Total Actual dwellings: 779688 (deficit 200,000) Total Families in 2050: 1,889,280 at HH size = Total Dwellings necessary in 2050: 1,889,280+200,000 = 2,089,280 	<p>Data for Land Allocation</p> <ul style="list-style-type: none"> Total Dwellings to build (land to allocate) is the difference between 2050 minus 2020: = 1,309,592 (~1,309,600) Total Dwellings to build (land to allocate) per year: 43,653 (~43,650) <p>Land area Required</p> <ul style="list-style-type: none"> Land required to build 1,309,600 at 60HH/Ha = 21,826 Ha (218 sq. km) Desired density of TOD Urban centrality = 60HH/Ha Area required per TOD = 14000 Dwellings = 233 Ha
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2050: Population and dwellings forecast

Accounting for the natural shrinkage of the family size and the existing deficit in the numbers of dwellings, it is estimated that 1.3 million dwellings are to be built in the next 30 years - 43,000 each year. If Urban Centralities (TOD's) are to be built in at a density rate of 60 dwellings/Ha. the demand will be for 22,000 Ha. (220 Km²) i.e. 740 Ha. (7.4 Km²) or 740 blocks of 100x100 meters annually. If there are 16 TOD's outside the metastatic urban conurbation that would mean 2800 dwellings, each year, in each of them. Anything less will be inadequate to address housing solutions and promote crowding and even slums.

However, this approach is not being considered. The Kerala urban typology of rur-urban environmental depletion is in the range of 11 dwellings/Ha. that is being promoted based on 'cultural peculiarities', and despite the environmental damage, impossible to bear infrastructure costs, and unaffordable social facilities. If this approach is not addressed, the need for land will be 6 times larger.

There should at least be a combination of both. The Web Lab focused on Urban Centralities and the Commuter Train intermodal stations, that will be able to house 50,000 dwellings each (170,000 inhabitants), and the rest in urban nuclei as dense as possible, and well connected by bus transport.



2050: The 3 alternative allocations of needed housing stock, waiting for the final one: political

The Web Lab developed 3 alternative location strategies according to international standards: Proportional, Tendential and Strategic. The Strategic one is the best but may be impossible to implement – so there could well be a mix of these 3. That final one will be the result of political negotiations and governance. The final column in the table has been left blank for the government to fill up.

10. Productive activities

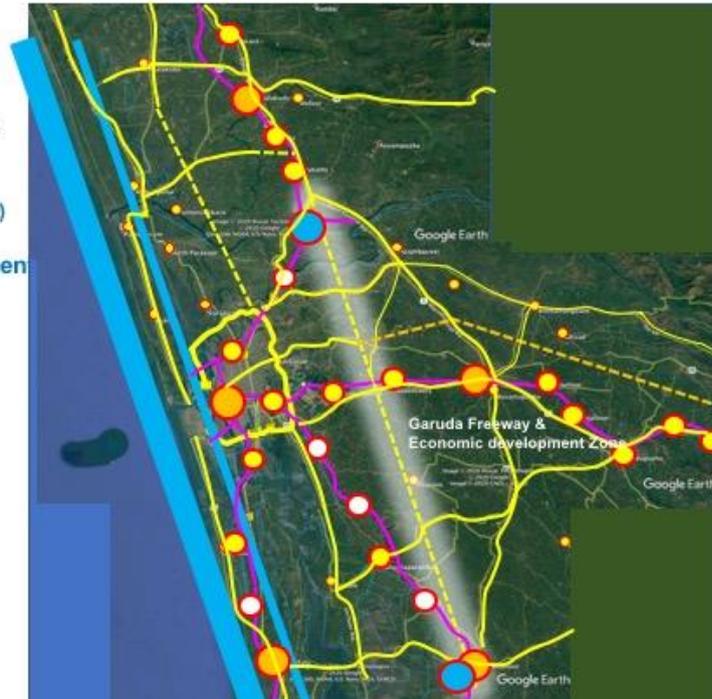
To approach the land required for economic development for the next 30 years a Strategic Plan should have been made in advance establishing the economic policies, the sectors to be promoted, the positioning of Kochi in a global metropolitan economic network. In the absence of it, the premise for the discussions in the Web Lab are based on the assumption that Kochi will be able to move from an economy based on low added value on heavy weight products (hw/lv), bound to take marine transportation to reach the markets, to high added value products with low weight (lw/hv), that will take air transportation instead.

Such industries will require land directly linked to the airport, to both airports – the one to north i.e. the expanded one and the one to the south, the new freight one. A sterilized Freeway that is access controlled, will be the vertebrate of the Kochi Metropolitan inland, connecting North to South Kerala, able to promote decentralization of polluting and obsolete industries as well as creating new business centralities of internationally targeted offices. This Web Lab has named this highway the Garuda Highway due to its direct connectivity between the two airports.

Mega Kochi

Gray Infrastructure system
First rank priority network

- Kerala Backbone Highway (KBH)
- Garuda Freeway
- Garuda Economic Development Zone



Garuda Highway for low weight/heavy weight goods development for international markets, connecting both airports

The Web Lab has been unable to calculate the number of jobs that will be created in the next 30 years and the sectors as there is insufficient data on economy. The Web Lab should have been able to calculate the expected jobs in each sector of the economy or at least in Industry, Offices and Commerce using standard data.

Unlike housing, land required for jobs is not a direct extrapolation of absolute figures. In housing the nuance is in the family size and in economy, it is the floor space each job requires. As the economy evolves, gets capitalized, production automated and value added, the floor space each job takes increases. In Madrid between 1960 and 1990 the rate had gone from 20 m² to 50 m². In the absence of standard data, forecasts could not be made for Kochi. The Web Lab has just set up criteria for location.

- **Offices** should be on the TOD's, connected across the metropolis by the commuter train. They should be located such that use of public transport would be outbound as well as inbound. That will make the best use of public transport capacity and reduce the financial difficulties to provide the right service.
- **Industry** cannot be served by public transport. When there are 200 jobs / Ha. public transport is uneconomical since there will most likely be just two full bus loads in the morning and afternoon. Transport must be provided by the firm to the nearest intermodal station and the firm will then be able to phase the time schedule of its employees.
- **Commerce** can either be located, most of it, in the TOD's, or at the logistic areas of the Industrial parks, at the junction of the highways corresponding to the strength lines of the metropolis

11. Social Facilities

Social Facilities serve the population directly and should be where the population is i.e. at the Urban Centralities. That will provide direct NMT access to those who live in that centrality. The population that does live in villages will be well served as well through the feeder bus routes. On the other hand, through the mass public transport of the commuter rail, they will be accessible as well, if necessary, to the population away from that specific TOD. That way the Social Facility can reach its optimum size as it might serve several Urban Centralities altogether reaching the population required for that optimum size.

When social facilities require more land, they can be located away from the Centralities where land cost is large, due to the accumulation of infrastructures and services on them. The best locations would be

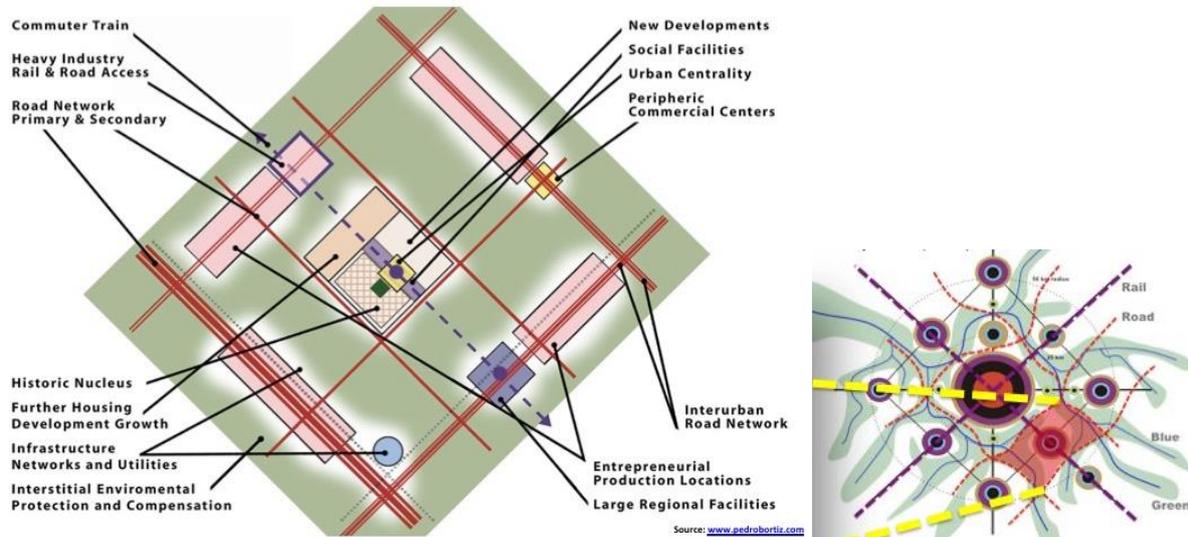
on the edge of green infrastructure as they will benefit from the dividends of the green, well deserved for the social purpose the facilities perform.

The Balanced Urban Development

Although this belongs to another territorial scale, that this Web Lab is not addressing, it is important to comment on the scales of the territory and have a dialogue for integrated development of Metropolitan Kochi. The Housing Team for the Web Lab made some Centralities composed of scales - from the architectural scale of buildings, the 1/50, to the world scale of geopolitics at 1/50 million with each scale requiring its specific discipline. The focus here is on Metropolitan Planning and so a Metropolitan scale – this planning is based on varieties of scales and the urban scale to be dealt by the Urban master Plans. These urban units that compose the metropolis - the Metropolitan Digits - that is the municipalities. The metropolitan plan has to contemplate the upper scales, National and International, as well as the lower one of Urban Design.

Metro-Matrix Balanced Urban Development

The Art of Shaping the Metropolis (P.B.Ortiz-McGrawHill)



The BUD (Balanced Urban Development) unit, as the Metropolitan Digit

Priority infrastructures missing

With these elements of metropolitan knowledge and Kochi analysis, the Web Lab proposed some priority projects that Kochi/Kerala may consider. Sometimes these projects take 20 years to be initiated and sometimes two years. Collective Intelligence is defined by the 'capacity of a social group (in this case a metropolis) to make the right decision in a reasonable span of time'. What can be called 'reasonable' is matter of discussion, but it is undeniable better to make the right decision in 2 years than in 20 years. These projects must be undertaken with previous Cost-Benefit Analysis, a Feasibility Study, or an Opportunity Cost evaluation.



**Priorities:
Structural Projects**

- 1) **Serviced residential land**
- for 1.8 million dwellings
- 2) **Commuting Train**
- service improvement
- 3) **Green Infrastructure**
- development and protection
- 4) **Cochin Garuda Freeway,**
- Kerala backbone N-S sterilized freeway.
- 5) **Garuda Economic project:**
- Economic development zone,
- Airport city and airport expansion.
- 6) **Centralities (TOD's)**
- identity characterization
- 7) **Commuter train extension**
- to Muvattupuzha 23 km
- 8) **High Speed Train**

Priority projects to fill up the void of essential infrastructures missing

Several of these projects have been discussed in the report in earlier sections: (1) Serviced Residential land at a pace of 44,000 dwellings annually (2) Commuter Train for 17 new Intermodal Stations beyond the urban conurbation (3) Green Infrastructure protection and improvement (4) Garuda Freeway connecting the two airports (5) Garuda development zone with the two Airports (6) TOD's Centralities (7) the 4th Commuter line extension (8) Speed train and (9) Port Facilities.

The details of the projects are estimated below. Please note that these are 'best guess estimates' in the absence of further details.

- a. **Serviced residential land** for 1.8 million dwellings in 32 urban centralities (TOD's) within non-motorized-transit (NMT) of the commuter train stations. Timeline 30 years.
 - 50,000 dwellings average catering to 170,000 inhabitants
 - 740 hectares each in 30 years @ 32 Hectares/year
 - Total inter-municipal daily trips: 2 million. (1 million by Commuter Train)

The non-TOD's must as well have a share of land development.
- b. **Commuting Train** improved service, frequency, and quality.
 - 15 minutes frequency, 18 hours service from 4.00 am to 10.00 pm
 - 45,000 passengers/hour on each line - Daily total 280,000 /line.
 - Potential 3 lines: 850,000 m. passengers daily.
 - With expanded 4th Line: **1.1 million daily passengers.**
- c. **Green Infrastructure** development and protection - parallel E-W River parks.
 - Flood prevention: flood basin protection, fluid management, blockage prevention.
 - Sea-level rise buffering zone: Seashore parks - progressive reactive response.
 - Leisure centres and service activities.
 - Metropolitan Social Facilities on protected border line.
- d. **Garuda Freeway,** as the backbone N-S sterilized access-controlled freeway
 - Metropolitan distributor
 - 200 meters wide protection zone for response to demand
- e. **Garuda Economic Development project:**
 - Economic development zone, Airport city and airport expansion.

- Industrial zones along the corridor. Base-economy target
 - airport international export freeway with access points every 1.5 km.
 - International Centralities: Airport City 1 and 2. High Speed Train Centrality.
 - Airport expansion (or relocation)
- f. **Centralities (TOD's)** identity characterization.
- International, Metropolitan, Tertiary, Logistics, Specialized (health, education, culture, etc.) Residential. (King, Queens, Rooks, Bishops, Knights, Pawns).
- g. **Commuter train extension** to Muvattupuzha:
- 23 km at an estimated cost of USD 230 m
 - 360 passengers with up to 1.5 million daily total service.
- h. **High Speed Train** layout and HST Intermodal Station location.
- Metro connection between HST Station and Airport
 - High accessibility from Kochi Centre and Garuda Freeway Development zones (complementary transport mode)
- i. **Port facilities expansion.**

Conclusions

The conclusions presented are for discussion with the higher decision-making authorities in the state. These conclusions are to be treated as recommendations based on the context of metropolitan academic approach and the empirical experience of numerous metropolises, some of them mentioned in the text. The key conclusions are as follows:

1. The strategic location of Kochi on the global maritime routes should be capitalized for Kochi's development.
2. The need to develop an economy of export with greater focus on high value-added goods that will reach their markets by air rather than by sea.
3. The necessity to enlarge actual airport facilities and the possibility of a second freight airport.
4. The need to enlarge the port facilities and evaluate the possibility of an offshore port facility, 3 miles away benefiting from a natural bank.
5. The very significant topographic structure of Kerala and Kochi Metropolis with the Directrix on the coastline and the Generatrix along the waterways upstream from the coast to the Ghats.
6. The need to protect these valuable ecosystems into a network of biodiversity and long-term sustainability.
7. The reticular system of the metropolis already discovered and developed by the 'ring' road highway in the rectangular shape fitting the strength lines of the reticular structure.
8. The standard phenomena of Kochi with central place depopulation and suburban sprawl depletion of scarce agricultural land.
9. The insufficient approach of actual transport projects that have not considered the metropolitan dimension and have remained restricted in their urban approach.
10. The need to expand the Commuter Train Service to allow for a metropolitan dimension of Grey Infrastructure.
11. The mediocre performance of Kochi as an economic attraction pole for labor force, behind many Indian metropolises.
12. The 50% population growth in the next 30 years that, coupled with family size shrinkage result in 100% growth in households.
13. The need to produce 7.4 Km² land each year if Kochi wants to avoid uncontrolled development and slum explosion.
14. The need to develop high density TOD's and provide serviced land for housing with 60 dwelling units/Ha, instead of the actual density standards of 11 dwelling units/Ha.
15. The requirement for new industrial land adapted to modern standards of security, accessibility, and plot size.
16. The provision of Social Facilities on the TOD's to serve not only the TOD population but also areas connected to feeder routes and Commuter Train.

Integrative results and proposed lines of action

The Metropolitan Web Lab worked for 7 days, from Tuesday 18 August 2020 to Tuesday 25 August 2020. The Working Groups were composed by local professionals appointed by the Municipal Corporation of Kochi supported by Fellows from the International Metropolitan Institute.

The objective and value of the Workshop was not just to deepen understanding in each sector on what that can be done by the institutions responsible for it within Kochi and Kerala, but also to coordinate and integrate the sectors. All of it with a long and wide perspective in time and space. The time span of 30 years, up to 2050, and the space framework, the dimension metropolitan Kochi will have in 2050 with 6.4 million inhabitants and a daily travel commuting of a 50 Km radius.

The findings and proposals of the sectors can be found in the annexures:

Integration within sectors

Each of the Teams worked on their own sector before sharing information for cross integration of concepts and proposals. The objective of this transversal integration is not only to achieve conceptual compatibility in the approaches but to achieve trans-sectorial synergies and multiplier effects.

a. Environment

- **Waterways/watershed protection:** The basic connection between ecosystems that need to interchange biodiversity is the hydrographic network. Rivers and waterways connect the seacoast and its lagoons with the inland Ghats. Canals, though artificial, increase that connectivity and must be preserved in the same manner. It is not only a question of preventing pollution and free flow of water to avoid unnatural floods, but the banks must also be preserved from construction encroachment and recuperated whenever it is possible.
- **Transversal continuous connectivity:** The east-west parallel rivers are not enough to connect the entire ecosystem. Connection only takes place across the Ghats and the sea. Intermediate transversal connections are necessary to provide a network that will make the ecosystem more resilient and will prevent the urban expansion to merge in an unsustainable continuum.
- **Multifaceted integrated ecosystem:** The ecosystem has many aspects and water, fauna, and flora, are only the more visible ones. They are all interconnected and necessary one to each other. The sector project has mapped them and has provided the clues to connect them together to promote resilience and environmental improvement.

b. Transport

- **Commuter Rail based Metropolis:** The transport system, as the environment, is a continuous system. All modes of transport have to be connected to work as a system. The places of connection are the intermodal stations of different ranks. The upper rank transport system in a metropolis is the Commuter Rail due to the distances, capacity, and time, it provides for metropolitan distance trips. This transport mode has been proposed to trigger a discussion within government on its importance and therefore action.
- **Flexible public transport highways:** Kochi has some proposals for highways 'flexible central public transport platform' to house buses, BRT's, or Tram's. These transport modes are good urban solutions but do not work at the scale of the metropolis. The solution, applied in Ahmedabad for long distances, produces inefficient travel times. It creates a continuum corridor that breaks down the environment system and produces inadequate urban quality environments such as heavy traffic (air pollution, noise, danger, etc.) and should never be supported by residential areas. Curitiba, that has long proven collective intelligence, inventors of the BRT, has reached the 3 m population threshold and are moving now to metropolitan rail transport.
- **Airport facilities expansion:** The future of Kochi's economy will depend on it increasing its export capacity with preference to high added value goods that will take the plane. Actual facilities are insufficient and an extension of the actual airport to a second runway as well as a second airport with land for expansion are necessary. The evolution of these facilities should respond to demand. However, an airport takes 14 years to build and 25 years to make the decision thus, demand forecasts must be

for 40 years ahead. It is recommended that the city not wait to achieve the full demand else, it will be too late and Kochi would have lost its chance to have a world position.

- **New Freight Port:** The existing port will be insufficient to serve the needs of the future. Well managed world class ports (i.e. Rotterdam) have expanded seawards. Kochi is presenting the idea, yet insufficiently studied, of an offshore port, building an artificial island on a shallow water bank 3 miles away from the coast – this proposal merits further research.



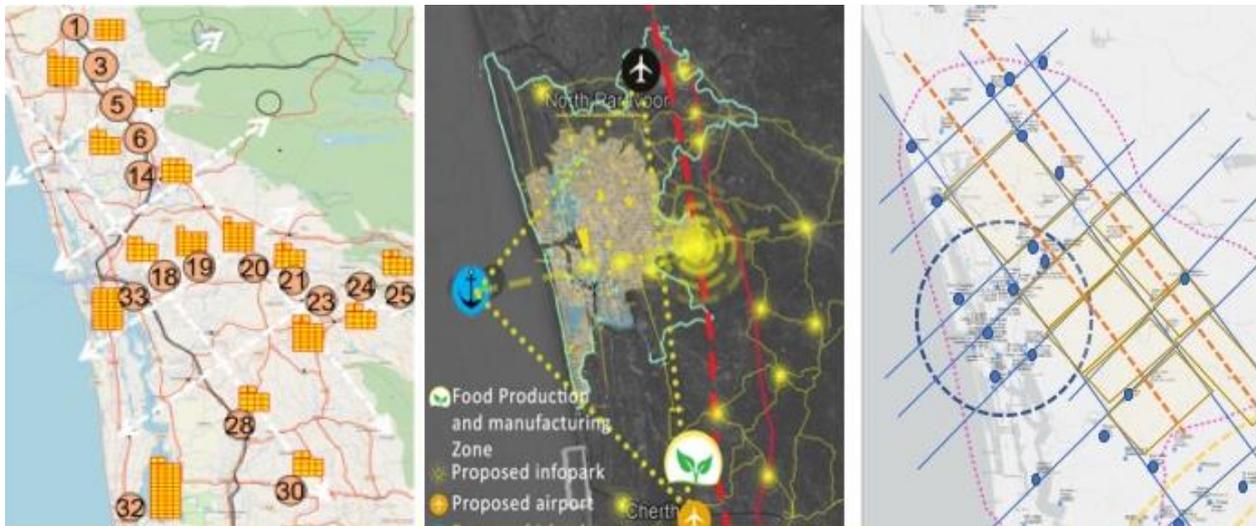
Environmental and Transport Plan proposals internally integrated

c. Housing

- **Strategic IUC priority location:** The large amount of housing required for 2050 and the land it will consume, especially if unplanned with uncontrolled low-density invasions, makes unavoidable a long-term planning and management program from the Kerala government. The only sustainable way ahead is the integration of the most important housing developments into the Urban Centralities around the Commuter Train Intermodal Stations. The Plan proposals have established 50.000 housing units in 17 IUC that would amount up to 170.000 inhabitants in each of them, almost 3 million people in total.
- **Political negotiations for final assignment:** The alternatives for housing allocation are four: **1) Proportional** to the actual population in the urban nuclei and municipalities, **2) Tendential** to the actual location preference from that population. Both these solutions are unsustainable, but well preferred by local politicians. This is an example for why housing policies must be a metropolitan management issue, not local. **3) Strategic**, would be the one proposed for the Plan. The Strategic solution that will be sustainable out of rationality. Unfortunately, local social forces will not permit such a solution. We must account for those flaws in governance and allow for **4) Political**, that will be the outcome of negotiations considering the previous 3.
- **Environmental compatibility:** The Strategic solution accounts as well for environmental constraints. Something the other 3 do not, specially the solutions 2 and 3, the ones implemented under the Kochi development rur-urban model of rural land invasion and environmental depletion.

d. **Productive Activities**

- **Transport highest multimodal rank locations:** Economic production requires transport to move goods and that is why it locates naturally in the highly accessible places. Offices look for centralities that will provide prestige, commerce looks for demand gravity models and industry looks for extensive cheap land as well connected as possible to integrate supply chains. If those conditions do not exist, they have to be created and infrastructure built to provide for the productive activities to thrive. The result will be job creation and wealth for the metropolis. How that wealth is shared to reach all segments of society is an issue that relates more to social governance than economic production.
- **Industrial Base-economy Axis:** Kochi does not have a productive axis that would link the productive zones to the export facilities. The only one is the abused Kanyakumari Highway congested and under risk of collapse. Attending to the metropolitan DNA structure of Kochi and Kerala a north-south metropolitan axis would be necessary to connect both airports. That axis, the Garuda Freeway can support the industrial expansion Kochi needs for the next 30 years. That production would be directly worldwide exported through the two airports. Such project would position Kochi among the world-class metropolises.
- **Tertiary local/metropolitan compatibility:** Tertiary sector, offices and commerce would be preferentially located in the Intermodal Urban Centralities (IUC) in such a way that the demand can access them on mass public transport. There are exceptions though. Large Commercial centres that require private transport access will be located on the intersections of the large metropolitan thoroughfares to take that traffic requirements away from the high quality central urban environments. Offices of international projection can be on specific urban centralities of their own with tertiary and quaternary predominance. However, these Centralities will be on the Mass Public Transport (Commuter and Metro) junctions with the large thoroughfares (i.e. Garuda Highway) to benefit from both public and private transport accessibility. Smaller commerce and offices will be shared and spread among the urban nuclei and local villages for residential proximity.



e. **Social Facilities**

- **Gravity Centre location for maximum accessibility:** Social facilities should not only be in the necessary amount to respond to the population needs, but they have to be accessible, in a minimum reach of distance and time to be able to respond to these needs. There is a trade-off conflict there that has to be solved by the Social Facilities administrative managers. The larger the facility the more effective it is, but the larger the facility the fewer there will be and those few large facilities will be far away from distant population. Once this dichotomy is solved the location is essential for accessibility. The priority locations are the Intermodal Commuter Stations in the Urban

Centralities. These Intermodal Stations serve the feeder bus terminals. Social Facilities will benefit from this privileged accessibility.

- **Political negotiations for final assignment:** Once the optimum size and the population they can serve are decided, there are different location alternatives.
 - a) Create large Social Facilities centrally that will host all sorts of facilities. Synergies will be produced, but equity will suffer, as those close to this selected centrality will be privileged. The ones that live in other centralities or their hinterland will suffer the inequity of distance.
 - b) Spread the different Social Facilities among the different Centralities. Equity will be improved as the distance to the facilities will be shared.
- **State-Metropolitan/Municipal-Local share:** Some facilities, those of daily or weekly use, need to be close to the population. Schools is a good example. This kind of facility should exist in every village and in every neighborhood of towns. We must leave the evaluation of size and location to the local authority. Other facilities are unique and serve the entire metropolis. An Opera House or an Olympic Stadium can be examples. Others can be multiple, as Hospitals, and thus spread in strategic locations of special accessibility for the most. The location of these two last categories must be the responsibility of the Metropolitan Government.

Integration across sectors

The purpose of a Metropolitan Plan is not to make independent sector proposals. That can be done by independent sector plans. The objective is to integrate all the sectors in such a way that there are no inconsistencies and contradictions that will jeopardize the efficiency and achieve multiplier effects where both sectors reinforce each other for synergic benefits. Some of those examples are to be found in:

- **Housing, Transport, Environment and Social Facilities:**

The only way to make the metropolis sustainable is to avoid metastatic sprawl of housing on valuable land requiring private transport for any trip. The viable alternative is to concentrate it in high density developments around the intermodal commuter train stations. Social Facilities, commerce and offices would be as well predominantly located in these Urban Centralities reducing trips, promoting NMT and increasing the convenience of proximity. Even in the USA, inventors of sprawl, they have reconsidered their land policies in the last 25 years and they are implementing the Urban Centralities approach under the name of TOD's.
- **Social Facilities, Transport and Labor:**

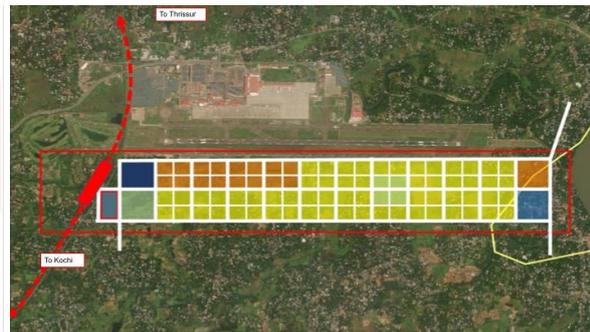
The location of Social facilities in the Intermodal Urban Centralities (IUC's) will be served by bus-feeder routes that deserve the hinterland. The hinterland population will have direct access to the required Social Facilities through this bus network. The hinterland population will also have access to a larger labor market through the intermodal station that links to the transport system. They will have more job opportunities within their reach and the firms will benefit from a larger labor force, with more diverse skills for their industrial or service production.
- **Industry, Housing and Social Facilities**

Obsolete Industrial locations developed prior to the sixties cannot provide any more the requirements of space and accessibility standards required to be competitive in a globalized economy. On the other hand, these locations are producing pollution of all sorts (air, noise, soil) and heavy load traffic risks to the population in proximity. It would be for the benefit of the industries and the residential areas around if these industries relocate, of their own will, in new competitive industrial areas connected directly by heavy traffic infrastructure to the export ports. This relocation can be fully paid, factory and machinery, by the plus-value acquired on the obsolete more centrally located land. The value catchment can be achieved by the brownfield renovation of the old sites into housing, social facilities, and green and civic spaces.

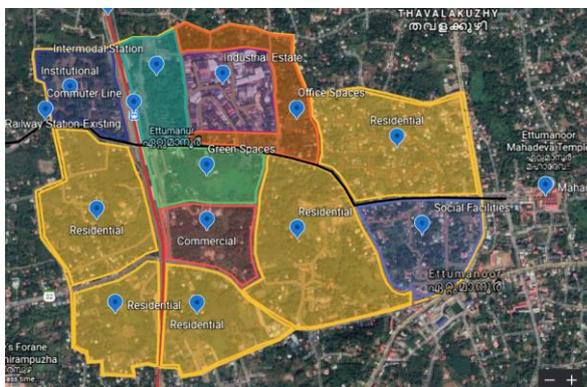
The Housing Team developed some draft approaches to the IUC's (TOD's) to check out their feasibility. These will obviously require a full fledge urban design project that might radically change the approach. However, the implementability check allows for the proposals to go ahead.



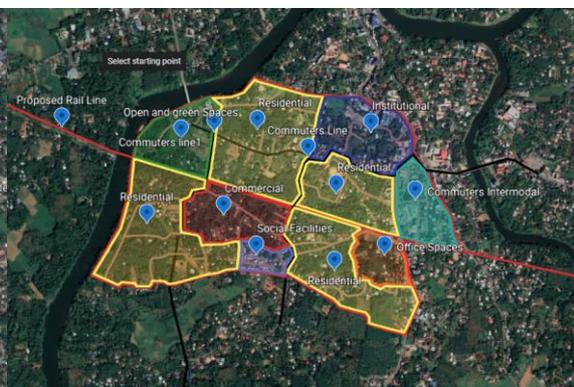
Koratty



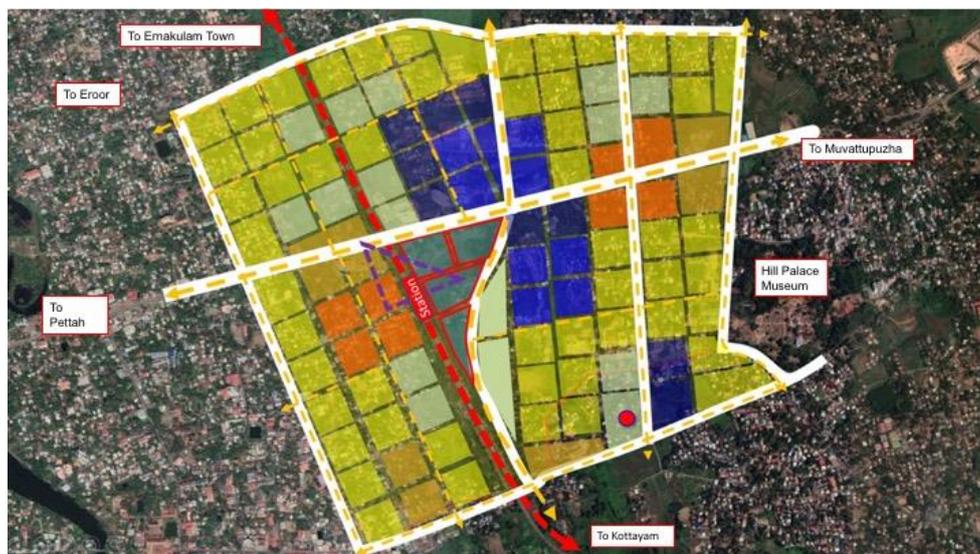
Nedumbassery- Airport



Ettumanoor



Muvattupuzha



Thripunithura

Integrated projects

There are multiple projects that emerge from this integrated approach. These are sector projects two or three per sector and have been chosen because:

- They are quick-win projects that can be developed, approved, and started in a short time.
- They are triggers of the more long-term strategic projects that will make a difference in the overall structure of Kochi for 2050.

The final decision to undertake these projects will require the feasibility study at least, if not a Cost-Benefit analysis and an Opportunity Cost evaluation. Due to the cost of these reports it is up to the institution, or institutions, that will be responsible for the final development, to promote them.

These projects are developed in the Sector reports. The extent and details of the proposals can be seen in these reports

a. Environment

1. Increase of farmlands.
2. Increase in bio-diversity hot spots with emphasis on bird population
3. Wildlife crossing for fauna transfer

b. Transport

1. Rapid Commuter Rail
2. Garuda Highway: for Economic Growth
3. Urban BRT feeder routes to Intermodal Stations

c. Housing

1. Selection and development of 5 Urban Centralities (Koratty Nedubassery Airport City, Ettumanoor, Muvattupuzha, Tripunattira to respond to housing land needs of 43,000 dwellings annually

d. Productive Activities

1. Garuda Industrial Development zone along Garuda Freeway
 - a) International centrality on Commuter crossing
2. Airport capacity expansion.
 - a) Airport expansion
 - b) Airport City
 - c) Freight Airport
3. Port Capacities Expansion
 - a) New port
 - b) Naval base

e. Social Facilities

1. Educational Facilities
2. Medical facilities
3. Old age homes

V. Next Steps and Follow Ups

The experience from the weblab is expected to have generated interest among the professionals and administrators and the documents will be widely shared. Further, this weblab is meant to generate a string of project ideas that can then be developed and implemented in a planned and systematic manner. There is a likely hood that some of the projects may be implemented in an isolated manner. However, this runs the risk of creating contradictions and diluted benefits.

The private and the public sector, will play a key role in making these project ideas a reality.

Private sector initiative

The public sector, aware of the responsibilities it throws upon themselves, and the risk of failure, decides to take the distant approach of promoting the private initiative to develop them. Then the ones that do not allow for divisibility or the ones that require large capital where the return is many years ahead, will not be undertaken.

The private sector will look for return, low risk and liquidity. That is their duty to the investors. It will focus on the projects that will be short run, minimum investment, servicing the demand, not the needs. Mostly disjointed incrementalistic projects that will not make a difference in the development of Kochi or Kerala. Anecdotal projects for the long-term and metropolitan-wide perspectives. Probably the BRT will be one of those.

This kind of development can be left to the local authorities and local business. They will find their own partners in the Indian context and even the international one, if the investment fits the return, liquidity, and risk parameters.

Public sector initiative (with PPP approach)

The public sector might realize that the projects that will be essential for the development of Kochi and the international positioning of India are the ones in size, length and volume that cannot be promoted just by the private sector. They will be privately financed, but for the private capital to dare to put forward large sums, as required by these substantive projects, it has to have political backing and administrative warranties but the question is who will provide these?

- a. **Local Government:** In India Local Government Finance is quasi inexistent. The public sector budget share of the economy is in itself very low (13%), and the transfer to the local authorities infinitesimal. In this context local authorities have very little capacity to initiate relevant projects. Apart from the fact that relevant projects are metropolitan, they bridge over many municipalities, and any local authority cannot invest away from its own territory and its constituents. Any intermunicipal agency to do so might take years, if not decades, to negotiate, agree, approve, finance, and set up.
- b. **State and Federal Government:** The metropolis is not the responsibility of the municipality of Kochi -it goes even beyond the District. The metropolis, the coordination among the diverse municipalities and urban administrations that form the metropolis of Kochi, is the responsibility of the State of Kerala. The large trans-municipal infrastructures needed by the metropolis to perform for the benefit of Kerala and India, cannot be addressed with the very poor municipal budgets. If the State of Kerala and the Government of India want to have an economic base to tax, they need to provide the indivisible goods that economic base requires to perform and perform well. The better the infrastructures, the better they will perform and the better Governments will be able to tax. It is the virtuous circle of development.

According to the Government of India norms, urban planning is a state subject. The Government of India develops policies and issues guidelines that the states adapt. State governments have limitations in terms of capacities and finances and there is reliance on the central government for both. 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.

VI. 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 Mr. Edwin Koekkoek, Counsellor, EU Delegation to India. Mr. Koekkoek described the EU's commitment to supporting sustainable urbanization in India and specifically mentioned the previous and ongoing commitments. He assured participants of continued support to India considering its large population and rising urbanization. Mr. Koekkoek concluded by hoping that events such as these Metropolitan Labs would indeed contribute to structured urban development in India.

The Keynote address was delivered by Smt. Soumini Jain, Hon'ble Mayor, Kochi City Corporation. She outlined her vision for an international, an economically attractive, and a liveable Kochi metropolis, and set the tone for the workshop. The Mayor stressed on the pressures faced by Kochi due to rising urbanization, the recent phenomena of urban flooding and the change in the rainfall pattern in the last few years that are impacting the usual ways of doing business. She hoped that the deliberations would provide insights on addressing these issues.

Mr. Neelabh Singh 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 actual Web Lab began immediately after. This was moderated by Ms. Sriparna Iyer, Key Expert on the IEUP Project. 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 3**. Some of the highlights of the presentations are as follows:

- **Environment:** The presentation described Kochi's fragile setting including pointing out that its coastal area was part of the Ramsar Convention designated wetland. The presenter highlighted the combined problems of reclamation and sea-level rise and identified some of the problems that included rising landslides linked to quarrying, reduced ground water levels and storage capacity and the changing rainfall pattern.
- **Transport:** The presentation discussed the reduction in the share of public transport, the need for seamless transportation and the creation of the Kochi Metropolitan Transport Authority with the aim of ensuring unified transportation.
- **Housing:** The presentation described the continuum of urban growth and the blurring of lines between rural and urban areas. There is a preponderance for single unit housing that accounts for about 85% of all housing with 51% houses vacant. There is a shortage of EWS and LIG Housing and a decline in private housing (as per CREDAI). The need for a land bank, dedicated EWS Housing and measures to tackle in-migration were some of the critical areas highlighted.
- **Social Facilities:** The presentation restricted focus on the Kochi Municipal Area and highlighted the lack of information on the metropolitan region. The presentation discussed the current availability of social infrastructure in terms of schools, hospitals and most importantly the need for addressing issues associated with rising aging population.
- **Productive Facilities:** The presentation described the services that Kochi will need in future to become an attractive and well-functioning metropolis.

Subsequently Mr. Ortiz led a presentation on metropolitan planning describing the differences between strategic planning and structural planning. He described Kochi's unique location and topography that already provided a framework for metropolitan development; the concept of 'urban centralities' and the 17 likely centralities for the Kochi metropolitan region. The discussion clarified the concept of scales for planning and discussed the types of planning interventions at various scales. Mr. Ortiz included some visualizations of the Kochi Metropolitan Region and asked that the Groups spend the next week revisiting their sectors through the metropolitan planning framework.

In the period between 19-24 August 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 25 August 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 4**. The projects identified in each of the sectors are as follows:

- **Environment:** The specific projects identified are (i) creation of farming areas between the urban centralities to limit their sprawl, increase food security, boost the rural economy and control in-migration; (ii) bio-diversity hotspots identified taking advantage of the topography of the state

and contributing to a positive impact on climate and (iii) wild life crossings have been identified at locations with highways and other transport infrastructure.

- Transport: The specific projects identified are (i) provision of a commuter rail network along existing rail lines; (ii) provision of a Bus Rapid Transport system along 2 corridors; (iii) provision of additional transport hubs within the metropolitan area and (iv) provision of a second airport along radial connecting the eastern side of Kochi.
- Housing: There were 5 Transport Oriented Development housing projects identified. For each of these, design proposals were also detailed.
- Social Facilities: The proposals were on education facilities, medical facilities, old age homes. The presentation also discussed the integration and clustering of facilities dictated by the urban centralities.
- Productive Activities: The presentation was built around developing an integrated economic hub and discussed a variety of specific activities like food production, info park, etc. The presentation also discussed the creation of potential urban centres for commercial development; an Info Tech park and an Agro Industrial park and the creation of a new naval city.

Mr. Ortiz subsequently discussed the **cross sectoral integration** of projects with the centrality of environment. A detailed **report** is included in **Annex 5**.

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

- Dr. Saswat Bandopadhyay is a renowned urban planning expert. He is the Founder of India's most successful social media platform – India Urban Forum and Indian Smart Cities Forum. He spoke about the challenges of metropolitan governance and the practical challenges to decision making when planning and implementing at the metropolitan scale. He mentioned that the 74th Constitution Amendment Act of the Government has provisions for a 'metropolitan planning committee' and the need to focus on them as likely platforms for metropolitan scale planning in India.
- Dr. Chetan Vaidya is the ex- Director of the National Institute of Urban Affairs. He talked about the efforts that have been made and are ongoing to improve decentralization and stronger local governments and institutions with greater autonomy for decision making. He reiterated the need for integrated planning and use of technology for improved decision making.
- Mr. R. Srinivas is the Head of the Metropolitan & Union Territories Division of the Town and Country Planning Organization, Government of India. He talked about the governments focus on metropolitan planning and mentioned that funds were available from the central government for certain cities to prepare their metropolitan plans. Mr. Srinivas opined that the Web Lab helped clarify many ideas and hoped that these could be repeated for capacity building.
- Dr. Angelique C. Rajan is Professor Urban Planning & Governance, Henley Business School, University of Reading UK. She had worked on preparing a Vision for Kochi in 2002 and underlined the need for a clear vision as a prerequisite for metropolitan planning. She commended the project ideas that had been presented in such a short time and hoped that these would be seriously considered and detailed out.

Mr. Neelabh Singh thanked all the participants and especially C-HED for their support and cooperation in the organization of the workshop. There were about 60 participants on both days of the workshop and the **list of participants** is included in **Annex 6**.

Annexure 1 - Agenda for the Web Lab

MAINSTREAMING RESILIENCE IN METROPOLITAN PLANNING WEB LAB WITH THE CITY OF KOCHI AND THE DELEGATION OF THE EU IN INDIA 18 AUGUST 2020 AND 25 AUGUST 2020

Zoom Link: <https://zoom.us/j/95960455272?pwd=cjVvVWtvT1R4Nys3ejZZFhzZ1RHUT09>

AGENDA

DAY 1: 18 August 2020

TIME: 11.00 am to 3.30 pm

DAY	DURATION	TIME	PROGRAMME	
Day 1	11.00 – 11.30 (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 – Mr. Edwin Koekkoek, Counsellor, EU Delegation to India	
		11.15 – 11.25	Address by Hon'ble Mayor, Kochi City Corporation Smt. Soumini Jain	
		11.25 – 11.30	Introduction to Mr. Pedro Ortiz and commencing the Web lab – Mr. Neelabh Singh, Team Leader IEUP	
	11.30 – 13.00 (1 hr 30 min)	ESTABLISHING THE BASELINE: THE KOCHI METROPOLITAN REGION		
		11.30 – 11.35	Introduction to the Groups – Ms. Sriparna Iyer, Senior Key Expert, IEUP & Moderator	
		11.35 – 11.50	Transport: Mr. G.P. Hari; Additional General Manager (Urban Transport) Kochi Metro Rail Limited	
		11.50 – 12.05	Housing: Ms. Raji R.; General Manager, CSML	
		12.05 – 12.20	Social Facilities: Dr. Nirmala Padmanabhan; Dean & Professor St. Teresa's College, Ernakulam	
		12.20 – 12.35	Productive Activities: Ms. Vijaya Venkitaraman; Independent Development Professional	
		12.35 – 12.50	Environment: Dr. Sunny George; Director SCMS Water Institute	
		12.50 – 13.00	Summary of the key challenges faced across the Thematic areas – Ms. Sriparna Iyer, Senior Key Expert, IEUP & Moderator	
	BREAK 13.00 – 13.30 All participants to rejoin at 13.30 sharp			
	PLANNING FOR A RESILIENT METROPOLITAN KOCHI			
	13.30 – 15.30 (2 hr)	13.30 – 13.35	Brief outline of Session - Ms. Sriparna Iyer, Senior Key Expert, IEUP & Moderator	
		13.35 – 15.15 Led by Mr. Pedro B. Ortiz	<ul style="list-style-type: none"> ▪ Overview of Metropolitan Planning ▪ Choose a project/detail an intervention to address most of the challenges identified in the specific thematic areas ▪ 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. 	
			<ul style="list-style-type: none"> ▪ Q&A and Wrap Up of Day 1 	
			15.15 – 15.30	

From 19 August 2020 to 24 August 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 24 August 2020
(sriparna.iyer@ieup.eu and siyer@ipeglobal.com)

AGENDA

DAY 2: 25 August 2020

TIME: 11.00 am to 3.20 pm

DAY	DURATION	TIME	PROGRAMME
Day 2	11.00 – 13.35 (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		
	14.00 – 14.45 (45 min)	THE ROAD AHEAD	
		14.00 – 14.05	Recap of Morning Session – Ms. Sriparna Iyer, Senior Key Expert, IEUP & Moderator
	14.45 – 15.20 (35 min)	14.05 – 14.45	Strategic Guidance and Roadmap – Mr. Pedro B. Ortiz
		14.45 – 15.00	Comments from Select Observers
		15.00 – 15.15	Open Forum
	15.15 – 15.20	Vote of Thanks – Mr. Neelabh Singh, Team Leader, IEUP	

Annexure 2 - Team Composition

MAINSTREAMING RESILIENCE IN METROPOLITAN PLANNING WEB LAB WITH THE CITY OF KOCHI AND THE DELEGATION OF THE EU IN INDIA 18 AUGUST 2020 AND 25 AUGUST 2020

COMPOSITION OF THEMATIC GROUPS

1. ENVIRONMENT

- Dr. Sunny George, Director SCMS Water Institute
- Dr. Rathish Menon, Assistant Professor Environmental Engineering, SCMS Water Institute
- Dr. Rajan Chedambath, Director C-HEAD
- Dr. Shaju Thomas
- Mr. Rajesh, Senior Town Planner GCDA
- Mr. Hrishikesh Satpute, Fellow International Metropolitan Institute
- Ms. Priyadarshini Alok, Fellow International Metropolitan Institute
- Mr. Arpan Johari, Fellow International Metropolitan Institute

2. TRANSPORT

- Mr. G.P. Hari, AGM (Urban Transport), KMRL
- Mr. B.J. Antony, Urban Transit Architect
- Ms. Swapna Ann Wilson, Consultant GFA
- Ms. Anupama, Local Project Coordinator UMTC
- Mr. Sooraj, Project Officer ICLEI
- Ms. Aparna Vijaykumar, Transport Planner WRI
- Mr. Ashwin Prabhu, Fellow International Metropolitan Institute
- Mr. Sagar Fulari, Fellow International Metropolitan Institute
- Mr. Siddharth Godbole, Fellow, International Metropolitan Institute

3. HOUSING

- Ms. Raji R., General Manager CSML
- Ms. Nisa, UPAD
- Ms. Anitha Mohandas, Assistant Environmental Engineer CSML
- Ms. Riby Mathew, Urban Planner
- Mr. George, Officer PMAY, KMC
- Mr. Siddharth Krishnamoorthy, Fellow, International Metropolitan Institute
- Ms. Sowmya Saisubramaniyaraja, Fellow, International Metropolitan Institute
- Mr. Avirat Inamdar, Fellow, International Metropolitan Institute

4. SOCIAL FACILITIES

- Dr. Nirmala Padmanabhan, Dean & Professor, St. Teresa's College Ernakulam
- Mr. Gheevarghese T.P., District Mission Coordinator Kudumbasree
- Ms. Sajna, District Coordinator, ASHA
- Dr. Sheeja Srinivas/Dr. Rajeev Jayadevan, IMA
- Ms. Aswathi Murali, Environmental Engineer, C-HEAD
- Ms. Anju, Urban Health Coordinator, NUHM
- Mr. Sivaprasad, KMC PRO, NUHM
- Mr. Biswadeep Acharya, Fellow International Metropolitan Institute
- Ms. Kishmita Arora, Fellow International Metropolitan Institute
- Mr. Riyazul Samad Binmohanamma, Fellow International Metropolitan Institute

5. PRODUCTIVE ACTIVITIES

- Ms. Vijaya Venkitaraman, Independent Development Sector Consultant
- Mr. Raj Nair
- Mr. Sambath Kumar, Head CSR, Cochin Shipyard Limited
- Ms. Hema Joseph, Industrial Extension Officer, KMC
- Mr. Mathew George, Fellow International Metropolitan Institute
- Mr. Piyush Girgaonkar, Fellow International Metropolitan Institute
- Ms. Madhivadhini Kalaiselvan, Fellow International Metropolitan Institute

Organisation	Brief
SCMS Water Institute	SCMS Water Institute was formed in 2010 to address the water related environmental problems affecting the society. The institute was initially named as Centre for Sustainable Water Technology & Management (CSWTM) which got renamed to SCMS Water Institute (SWI) in 2014.
C-HED	The Centre for Heritage, Environment and Development is an institution functioning as the research and development wing of the Kochi Municipal Corporation, in the fields of Urban Development and Governance, Environment, Tourism, Culture and Heritage. Established in the year 2002 by the city administration, C-HED has been an integral part of the planning efforts and development aspirations of the Kochi Municipal Corporation. It is responsible for co-ordinating major development projects, events, planning initiatives, international projects, playing the role of a knowledge partner and resource centre, imparting academic support for the budget preparation and economic planning for the Kochi Municipal Corporation.
GCDA	The Greater Cochin Development Authority is the planning and development authority of the metropolitan area of Cochin. GCDA's functions are: <ul style="list-style-type: none"> – To guide urban development by checking urban sprawl and promoting health growth of urban and rural areas through long term, short term and action area oriented detailed development plans. – To prepare and notify draft General and Detailed Town Planning Schemes in consultation with the Town Planning Department. – To implement General and Detailed Town Planning Schemes sanctioned by Government. – To co-ordinate the activities of the various agencies – To determine the phasing of development in providing open spaces and recreational facilities depending on the needs of the region.
KMRL	Kochi Metro Rail Limited, is a centre-state public sector company in Kochi, Kerala, India, that operates the Kochi Metro and Kochi Water Metro. The company was incorporated on 2 August 2011. The KMRL is also involved in the planning and implementation of Metro cycle, Metro taxi, Metro bus Services.
GFA	GFA Consulting Group is one of the leading European consulting firms active in the development cooperation sector and is providing technical assistance in various capacity building and urban infrastructure projects in Kochi.
UMTC	UMTC is India's leading urban transport consultancy firm that focuses on developing sustainable urban mobility solutions. It is a unique partnership between the Ministry of Housing and Urban Affairs (MoH&UA), Government of India (GoI), Government of Andhra Pradesh (GoAP), Andhra Pradesh State Road Transport Corporation (APSRTC) and Infrastructure Leasing and Financial Services Limited (IL&FS). The company provides innovative mobility solutions across India and abroad.
ICLEI	ICLEI – Local Governments for Sustainability is a network of more than 1,750 local and regional governments, supported by a team of global experts, driving sustainable urban development worldwide. The South Asian arm of ICLEI - Local Governments for Sustainability, aims to build and serve a regional network of local governments to achieve tangible improvements in regional and global sustainability through local initiatives.
WRI	WRI Ross Centre for Sustainable Cities builds upon WRI's successful track record in urban activities, introducing game-changing solutions that create more prosperous, livable cities.
CSML	Cochin Smart Mission Limited is a Special Purpose Vehicle (SPV) formed for the sole purpose of implementation of smart city mission at the city level in

	<p>Kochi. The SPV will plan, appraise, approve, release funds, implement, manage operate, monitor, and evaluate the smart city development projects</p>
<p>St. Teresa's College Ernakulam</p>	<p>St. Teresa's College, Autonomous is committed to enriching the lives of students by empowering them. They provide holistic education that enables students to actively participate in community life. Women's education is a crucial factor that contributes to nation building and for the past ninety years they have been educating young women from different strata of our society.</p>
<p>Cochin Shipyard Limited</p>	<p>Cochin Shipyard was incorporated in the year 1972 as a fully owned Govt of India company. In the last three decades the company has emerged as a forerunner in the Indian Shipbuilding & Ship repair industry. The Shipyard also trains graduate engineers to marine engineers who later join ships both Indian and foreign as 5th Engineers. 100 are trained every year.</p>
<p>NUHM</p>	<p>The National Urban Health Mission (NUHM) as a sub-mission of National Health Mission (NHM) has been approved by the Cabinet on 1st May 2013. NUHM envisages to meet health care needs of the urban population with the focus on urban poor, by making available to them essential primary health care services and reducing their out of pocket expenses for treatment. This is achieved by strengthening the existing health care service delivery system, targeting the people living in slums and converging with various schemes relating to wider determinants of health like drinking water, sanitation, school education, etc. implemented by the Ministries of Urban Development, Housing & Urban Poverty Alleviation, Human Resource Development and Women & Child Development.</p>
<p>IMA</p>	<p>Indian Medical Association is the only representative voluntary organization of Doctor of Modern Scientific System of Medicine, which looks after the interest of doctors as well as the wellbeing of the community at large. The Association was started in 1928 on the 5th all India Medical Conference at Calcutta with the avowed objectives:</p> <ul style="list-style-type: none"> - Promotion and Advancement of Medical and allied sciences in all their different branches. - The improvement of public Health and Medical Education in India. - The maintenance of honour and dignity of medical profession.

Annexure 3 - List of participants

First Name	Last Name	Organization
Priyadarshini	Alok	School of Planning and Architecture
T. P.	GHEEVARGHESE	Kudumbasree
R	Srinivas	TCPO,MoHUA
Mathew	george	international metropolitan fellow under pedro b ortiz
Asha coordinator	Ernakulam	National health mission
Prince	Agrawal	IPE Global
Kishmita	Arora	Self employed
Biswadeep	Acharya	International Metropolitan Fellow
Deepakshi	Vashishth	AETS
Siddharth	Krishnamoorthy	IMI
Hans	Enggrob	Lyninco
SAGAR	FULARI	metropolitan fellow
Chetan	Vaidya	giz
Simmi	S	C-hed
Dr. Sheeja	Srinivas	IMA
Mathew		Distributed Energy
SIVAPRASAD	D	National Health Mission
Madhivadhani	K	SRM
Sriparna	Iyer	IPE Global
Hema Joseph		KMC
Antony		GIZ
Dr.Saswat	Bandyopadhyay	CEPT
Riyazul	Binmohammad	Rusbm Studio
Hrishikesh		SPA Bhopal
Sandith	Thandasherry	Navalt Boats
Piyush-India		IMF
Vijaya	V	Independent
Pankaj	Yadav	IPE global limited
swati	patel	IPE Global
Pedro B.	Ortiz	IMI
N M	Salim	N M Salim& Associates
Aparna	Vijaykumar	wri
Angelique	Chettiparamb	University of Reading
Siddhartha	Godbole	International Metropolitan Fellows
Swapna	Wilson	GFA Consulting Group
LIPY RAMACHANDRAN		IPE Global limited
Anupama	Warrier	UMTC
NIRMALA	PADMANABHAN	St, Teresas College

Ashwin S	Prabhu	IMI
HARI	G P	Kochi Metro Rail Ltd
IPE-NB-897		IPE Global
Raji	Ramachandran	Cochin Smart Mission Limited
Rajesh T N		GCDA
Sooraj		ICLEI South Asia
Dr. Rajan	Chedambath	Centre for Heritage, Environment and Development
Mayor	Kochi Municipal Corporation	Kochi Minicipal Corporation
G P HARI		Kochi Metro Rail Ltd
Joannah	Varghese	Independent Urban Researcher
Edwin	Koekkoek	eu
Sunny	George	SCMS Water Institute
Rajesh	Nair	Sevents Consultants
Ar Arpan	Johari	AW Design
Umang	Raina	IPE Global
Deepakshi Vashishth		
Nissa A		cochi web lab
Neelabh	Singh	IEUP
George	Cherian	kochi corporation
Deepakshi Vashishth		
Ramesh	Nair	GIZ india
anitha		CSML
Ratish	Menon	SCMS Water Institute
SOWMYA P S		IMF
Aswathy	Murali	c-hed
Riyazul Samad	Binmohammad	Rusbm Studio
959 6045 5272		MMRDA
Sanjay	Dhawan	AETS Consultants

Annexure 4 - Presentations from Day 1

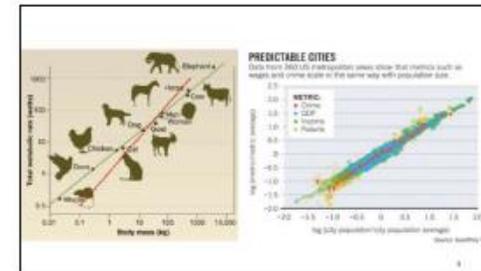
Mega Kochi 2050 by Pedro B. Ortiz



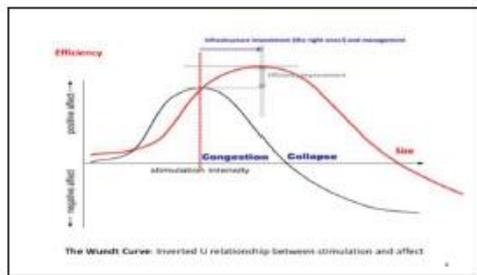
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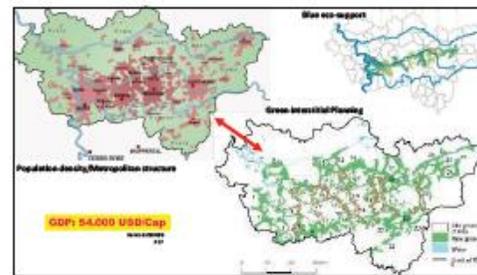
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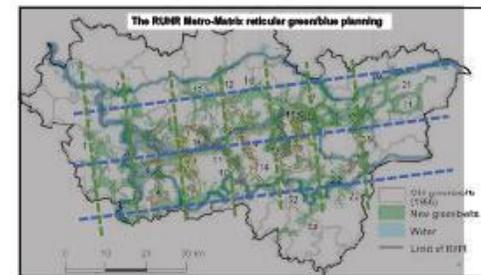
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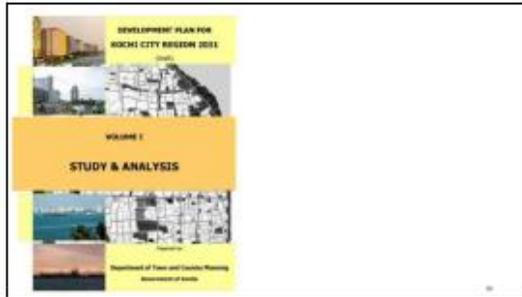
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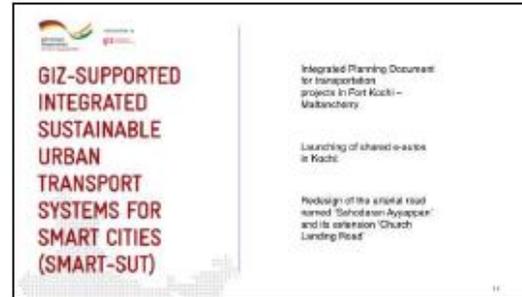
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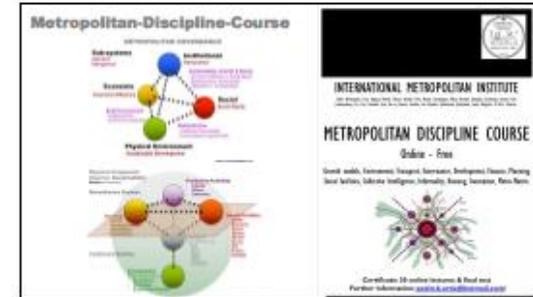
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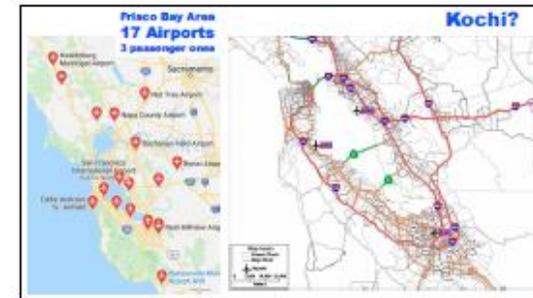
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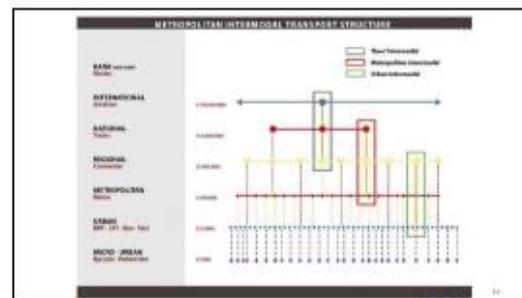
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Metro-Course			
Metropolitan Scale			
Spatial Scales and Disciplinary approach			
Scales Dialogue	Scale	Discipline	Knowledge areas
↑	1: 10,000,000	Geopolitics	IR, INFO, ILL, IU, IM, OPIE
	1: 1,000,000	Regional / Continental Policy	IR, CEI, UE, SE, SEE, JCE
	1: 100,000	National Development	Politics, Economics, Sociology, Environment, Geography
	1: 10,000	Metropolitan Planning	Economics, Sociology, Infrastructure, Environment, Urbanism
	1: 1,000	Urban Planning	Planning, Urbanism, Urbanism, Environment, Transport, Urbanism
	1: 100	Urban Design	Urban, Planning, Technical, Engineering
↓	1: 10	Architecture	Urban, Planning, Technical, Environment, Transport, Urbanism

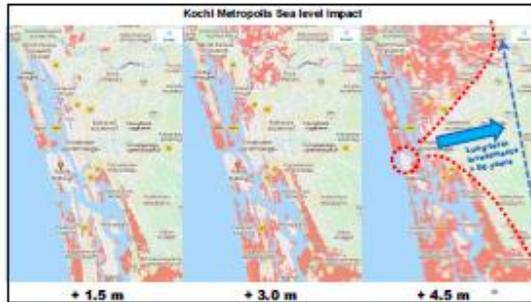
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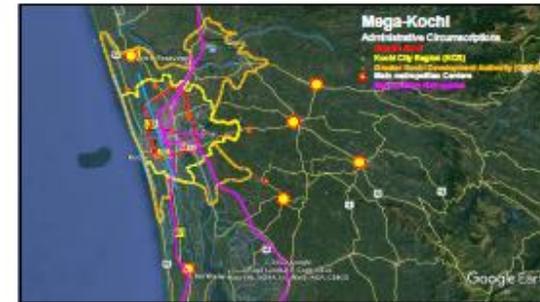
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Growth Challenge

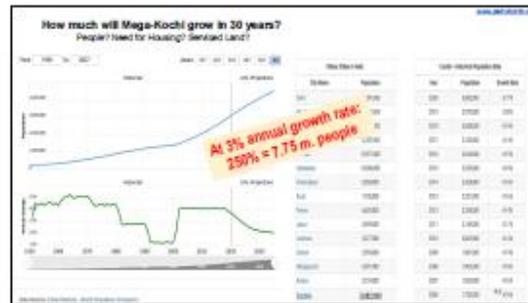
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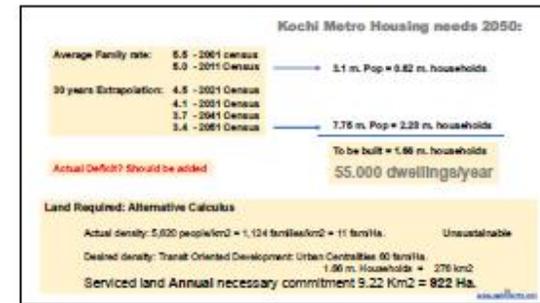
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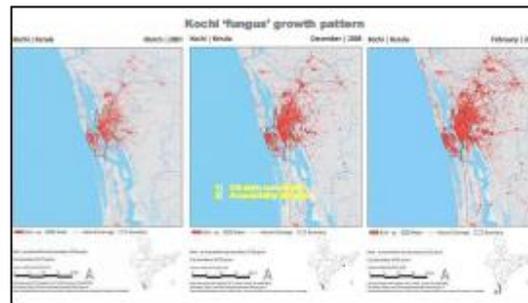
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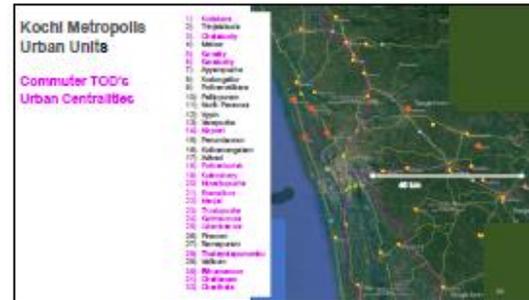
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Each Region - Cities & Towns with population less than 1 Lakh

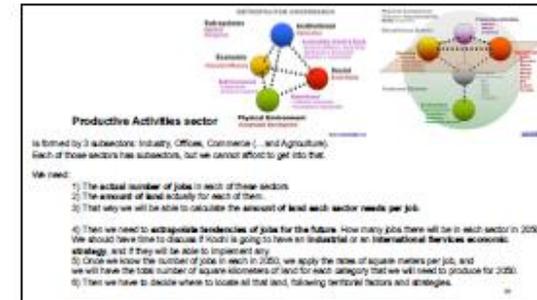
HOUSING Alternative Distributions

City	Population	Area	Population Density	Municipality	Prevalent	Neoliberal	Strategy	Index
1								
2								
3								
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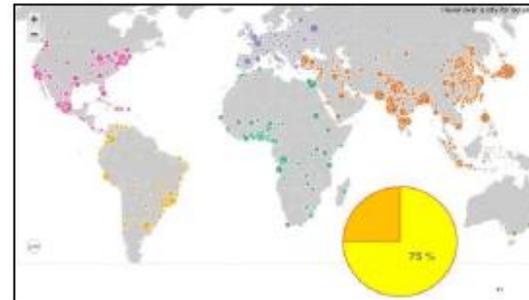
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The United Metro/Nations

Adding the United States

City	Population	Area	Density	Municipality	Prevalent	Neoliberal	Strategy	Index
1								
2								
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Misinterpretation Reinterpretation

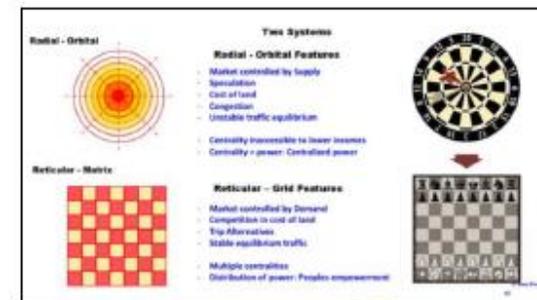
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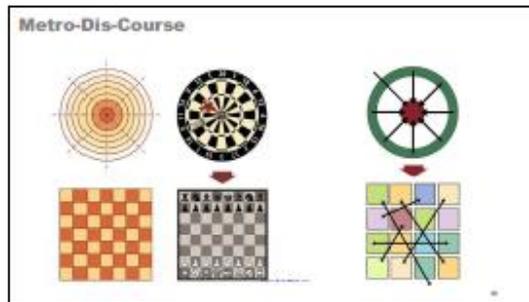
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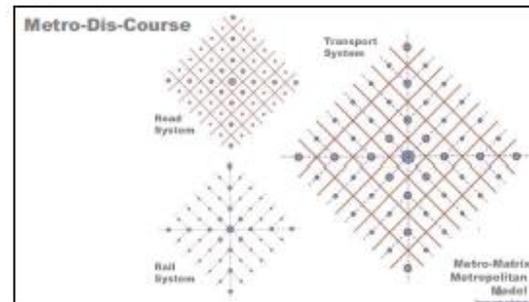
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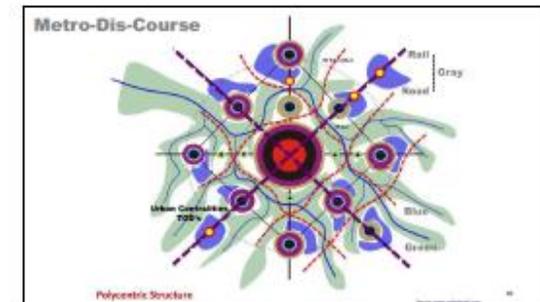
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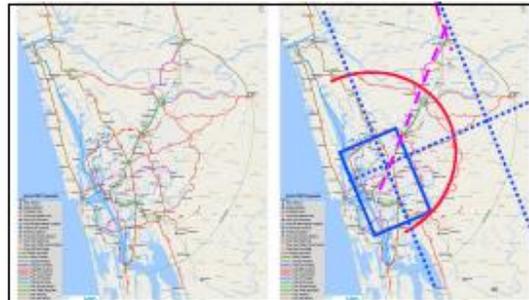
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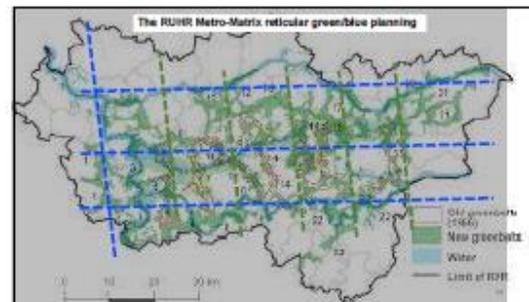
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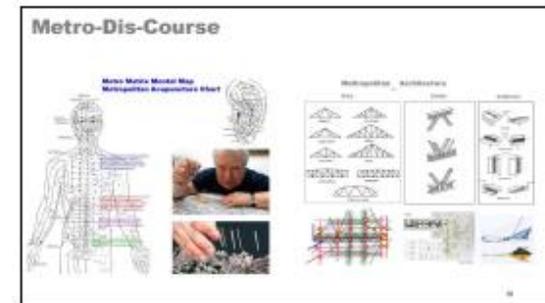
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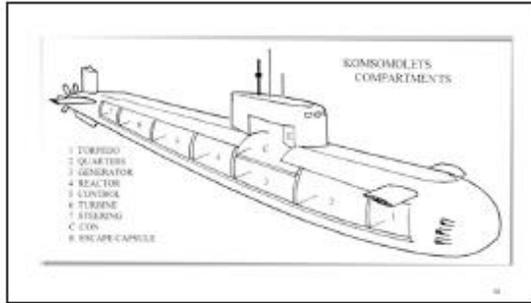
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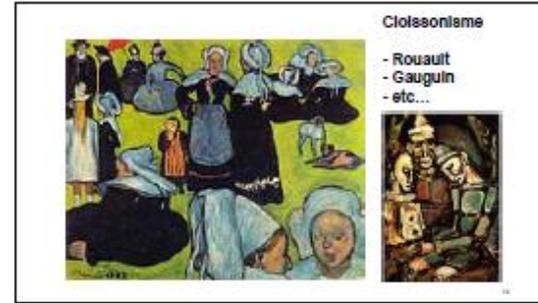
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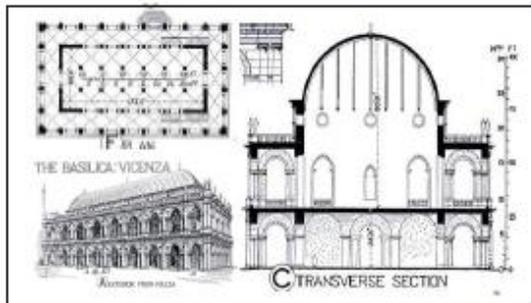
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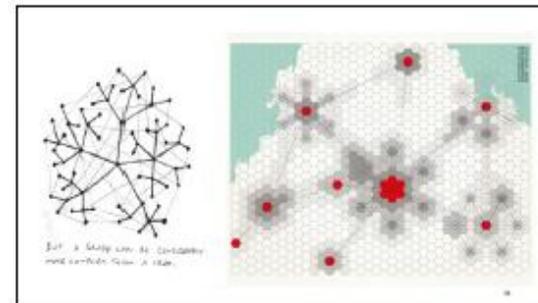


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Metropolitan Scale
Spatial Scale and Disciplinary approach

Scale	Disciplines	Knowledge areas
> 100,000	Capitalism	Law, History, Art, Religion, Culture
10,000 - 100,000	Regional/Continental Politics	Law, History, Art, Religion, Culture, Urban
1,000 - 10,000	National Development	Politics, Economics, Geography, Environment, Geography
100 - 1,000	Metropolitan Planning	Economics, Sociology, Urbanism, Environment, Urban
10 - 100	Urban Planning	Planning, Urbanism, Services, Commerce, Transport, Environment
1 - 10	Urban Design	Space, Urbanism, Services, Engineering
0.1 - 1	Architecture	Light, Space, Urbanism, Materials, Structure, Installation, Budget

77



78



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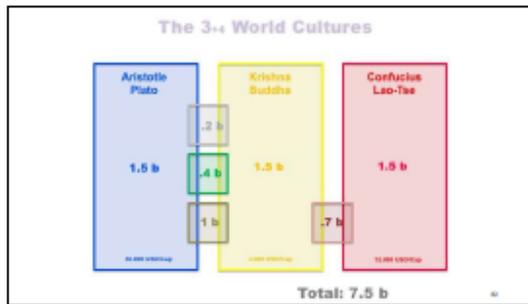
Policymaking DEFCON Levels

	Monetary Policy	Fiscal Policy	Financial Reg.	Trade Policy
DEFCON 5	WTF? Inflation	WTF? Deficit	Stable	Stable
DEFCON 4	Interest rate hikes	WTF? Deficit	Stable	Stable
DEFCON 3	Quantity of money Stable interest rate & base	Targeted stimulus	Stable	WTF? Deficit
DEFCON 2	Asset purchases QE	Direct stimulus Delayed Taxes	Temporary rules Restricting R capital	Temporary, targeted tariff reductions Export bans
DEFCON 1	Expanding QE to all asset purchases	Unleashed Lending Goods Financing	Expanded interest lending restrictions EMU/Trade/Fiscalization	Expansion to all tariff increases

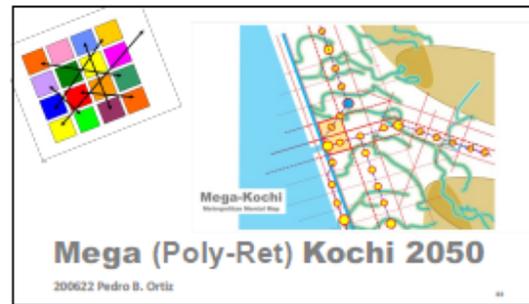
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82



83

Social Infrastructure: Cochin Municipal Corporation

SOCIAL INFRASTRUCTURE
COCHIN MUNICIPAL CORPORATION

1

PROFILE OF COCHIN MUNICIPAL CORPORATION

NAME	COCHIN CORPORATION
DATE OF ORIGIN	1967 NOVEMBER 1
AREA	74.88 sq.km
POPULATION	6,77,261
SCHEDULED CASTE	11,286 - 1.3%
SCHEDULED TRIBE	2,144 - 0.32%
DENSITY OF POPULATION	71791 sq.km
LITERACY	86.4%
NUMBER OF DIVISIONS	74

Source: Census 2011 and Cochin corporation

2

SOCIAL INFRASTRUCTURE
EDUCATION

SCHOOLS

TYPE	NO OF INSTITUTIONS
LOWER PRIMARY	34
UPPER PRIMARY	31
HIGH SCHOOLS	28
HIGHER SECONDARY & VASC	32

COLLEGES AND OTHER INSTITUTIONS

- TEACHER TRAINING INSTITUTES: 4
- ARTS AND SCIENCE COLLEGE: 7
- ENGINEERING, MEDICAL COLLEGE: 0
- TECHNICAL / PHARMACEUTICAL TRAINING INSTITUTES: 2

Source: <https://era.mha.gov.in>

3

HEALTH- MEDICAL INSTITUTIONS

ERNAKULAM		MADRAS	
HOSPITAL	DISPENSARY	HOSPITAL	DISPENSARY
4	23	2	23

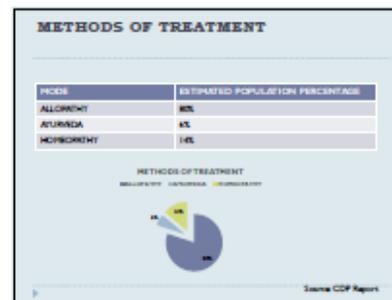
Source: CDF Report

ALLIED HEALTH INSTITUTIONS

PHC	11
CHC	3
GEN HOSPITAL	1
DISTRICT HOSPITAL	1
TB CENTRE	1
MOTHER AND CHILD SPECIAL HOSPITAL	1
PAEDIATRIC CARE UNITS	11
MOBILE DISPENSARY	1

Source: www.cochinmunicipalcorporation.gov.in

4



5

Fitness, wellness, care centres

PARKS	13
STADIUMS	3
OLD AGE HOMES	8
CULTURAL CENTRES	10
COUNSELLING CENTRES	
WORKING WOMEN HOSTELS	
ONE STOP CARE CENTRES FOR WOMEN	
JUVENILE HOMES	
GIVING PUBLIC PLAY GROUNDS, PRIVATE PLAY GROUNDS	

6

DAYCARE CENTRES

- ANGANWADIES
- Total Number : 280
- Own building - 20
- Others - 260

PRIVATE DAY CARE FACILITIES:

PAUKAL VESUDU DAY CARE FOR THE AGED:

7

OTHER AMENITIES

COURTS	10
POST OFFICE	27
POLICE STATIONS	16
NO OF AKSHARA CENTRES	

8

BANKING

BANKS IN ERNAKULAM DISTRICT

NATIONALISED BANKS	
URBAN	585
RURAL	28
TOTAL	613
PRIVATE BANKS	
URBAN	340
RURAL	21
TOTAL	361

FINANCIAL INCLUSION IN COCHIN CORPORATION

INDICATOR	AREA - COCHIN CORPORATION
% of households with access to banking facilities	92.74

Source: CDF Report

9

TRANSPORTATION

Air Transport

- ✓ The Airport and Aerotropolis
- ✓ Multiple runways for the aircraft including Private landing strips need to be developed
- ✓ The Airport area Needs To be developed into a Travel and Logistics Hub for long Distance travel and Freight, Integrating Railways, Suburban rails, Metro rail
- ✓ Aerotropolis with all amenities, Entertainment and shopping arena to welcome the International and National guests while on transit.
- ✓ Maintenance Hangar for International Aircraft Companies like Boeing and Airbus needs to be Developed to attract More Inbound International flights

TRANSPORTATION

Air Transport

- ✓ Drones and Freight Hub
 - ✓ Courier and Online delivery system using drones
 - ✓ Medical Emergency drones and Helicopter Ambulance
 - ✓ Freight Hub with Online tracking
- ✓ The Air/Heli Taxi and Air strips / Helipads
 - ✓ Helicopter and small aircraft taxis to all major towns
 - ✓ Private landing strips across Kerala connecting tourist spots

WATER INFRASTRUCTURE

WATER SUFFICIENCY

- ✓ Desalination and Purification of Sea / Lake Water
 - ✓ Desalination plants in City to supply city area
 - ✓ Proper Artificial Intelligence guided pressure and quality maintenance
 - ✓ Potable water connectivity to all
- ✓ The Rain water Harvesting and recycling systems
 - ✓ Reduce Recycle and Store all water as much as possible

MEDICAL INFRASTRUCTURE

Medical Rescue

- ✓ Critical care ambulances
 - ✓ Medical Emergency drones and Helicopter Ambulance
 - ✓ High Speed lanes for ambulances to major hospitals
- ✓ Flood and fire rescue systems
- ✓ Unified Fire Fighting, Flood rescue systems and High alert Teams
- ✓ Tertiary, Secondary, Primary and Mobile Hospital Network

LAND UTILISATION

New Strategic Naval city

- ✓ Relocation of Naval Base and Port activities
 - ✓ A Reclamation Island of 6000 acres Approx. is available 3 nautical miles from our City limit
 - ✓ Ideally located close to the International Sea route with low or no cost on Recurrent Dredging
 - ✓ Transshipment terminal at the new Island will attract larger motherships
 - ✓ Navy will benefit from swift action on International border also.
 - ✓ A larger Airport can be planned for airforce base also making it a strategic point for the Indian military

LAND UTILISATION

NEW PLANNED CITY

- ✓ Development of 1900 Acres Wellington Island into domestic and private airport and Aero City
 - ✓ A Smart city with planned Water front residences and Hotels
 - ✓ Tourism and Entertainment Zones for the Cruise passengers
 - ✓ Cruise terminals and Luxury yachting and water sports arena and a Oceanarium may be planned

ENVIRONMENTAL

Pollution control

- ✓ Solid Waste Management
 - ✓ Organic Inorganic solid Waste Management to Reduce Land fills
 - ✓ Centralised Medical waste management for the City
 - ✓ E waste Recycling and reduction plans
- ✓ Water Pollution Controls
 - ✓ Domestic Sewage treatment plants made compulsory for all buildings above 6000 square feet
 - ✓ Centralized Sewage water treatment plants before emptying into Canals, Rivers, Backwaters or Sea in private public partnership
 - ✓ Plastic and floating waste removal plans to clear water bodies.

ENVIRONMENTAL

Pollution control

- ✓ Air pollution Controls
 - ✓ Electrical and Electronic and low emission Vehicles
 - ✓ Public transport promotion
 - ✓ Factories with Decarbonising and Low emission chimneys
 - ✓ Air pollution indicators in Industrial and High traffic areas
 - ✓ Radioactive watch to detect harmful Radiation
- ✓ Noise Pollution
 - ✓ Low noise factories and transport systems
 - ✓ Ban of Public addressing systems except in specified sound insulated meeting and entertainment spaces
 - ✓ Noise absorbing Buildings to be planned
- ✓ Light Pollution
 - ✓ Reduction of artificial light sources and ecologically important areas during Night
 - ✓ This will improve nocturnal flora and fauna that uses moonlight and stars for their life.

ENVIRONMENTAL

- Green initiatives
 - ✓ Green Belt for industries
 - ✓ Wider Green Belt proportionate to the carbon foot print of the industries
 - ✓ Town forestry for all new residential multi-storied buildings
 - ✓ Parks, shopping malls Schools and Colleges with larger tree and garden spaces
 - Green Building Strategies
 - ✓ Vertical gardens and roof garden for Apartment complexes,
 - ✓ Sound and heat absorbing materials for construction
 - Green Energy Sources
 - ✓ Renewable & Green Energy sources Like solar, wind and waste to energy initiatives



Environmental Scenario of Kochi Metropolitan Area

Environmental Scenario of Kochi Metropolis Area

DR. SURINNY GEORGE
DIRECTOR
SCMS WATER INSTITUTE

1

Area of Interest

- Kochi Metropolis- Term suggested by Prof. Pedro B. Ortiz
- We are considering an area of about 50km in land of the coast of Kochi
- Therefore this area form a typical cross section of Kerala covering the low land, midland and certain parts of the highland (foot hills of western ghats)
- The low land is almost a plain terrain characterized by a number of estuaries
- The midland is covered by undulating topography

2



3

Climate

- Average annual rainfall is 3000 mm but varies spatially and temporally
- Climate is hot and humid upto foot hills of Western Ghats
- The area is benefited by 2 monsoons
- The western ghats although out of the region of interest, certainly has a profound influence on the climate of the proposed area

4

Coastal Part of Kochi Metropolis

- Coastal part include almost 20 to 30 percent of the area
- Population density above 3000 per sq.km
- Vast stretch of backwater lakes
- Unique wetlands (part of Ramsar Wetland)
- West coast is one of the most productive waters in the world (eg: mud banks)

5

Fresh water Resources

- The major river flowing within the area is Periyar
- Formerly had plenty of paddy fields. Now very few are existing
- The area contain enormous domestic open wells and village ponds
- Wide network of natural and man made canals
- Manmade reservoirs used for irrigation and electricity generation

6

Context of Environment of the Area

This part of Kerala need to be considered as a single and continuous ecological unit
Although the area stated with an exceptionally rich natural resource base, the scale and speed of ecological degradation is stupendous.
Ecological destruction started from the colonial times for exploitation of resources
Post-independence misapplication of resource management

7

Major Environmental Problems in the Area

8

Degradation of land

- Quarrying (granite & laterite)
- Reduced water storage potential in the soil
- Soil erosion
- Water logging
- Foliating of soil through heavy use of chemical fertilizers & pesticides

9

Degradation of Water

- Drinking water scarcity
- Disappearance and reclamation of water sources (springs, ponds, wells, wetlands etc)
- Water pollution (heavy metals, pesticides, domestic or sewage etc)
- Construction of major dams
- Sand mining
- Lack of sewerage system
- Declining ground water levels and intrusion of salinity into the Inland

10

Degradation of Bio-resources

- Reduction of area under forest cover as well as loss of urban vegetation cover
- Massive spreading of monoculture
- Loss of biodiversity (primarily Urban Biodiversity)
- Significant reduction in Ecosystem Services
- Carbon footprint concerns
- Lack of biodiversity sensitive urban design
- Lack of green infrastructure
- Limited ideas for linking ecosystems for human well being

11

Air Pollution

- High concentrations are reported in winter and pre-monsoon period
- Mostly traffic related contribution
- Greater Kochi Industrial cluster 24th among the most polluted clusters in India (CPI, 2012)

12

Sound Pollution

MORNING NOISE LEVEL NOON NOISE LEVEL EVENING NOISE LEVEL

13

Influence of Climate Change

- Change in rainfall pattern rate & intensity
- Frequent flood and drought
- Reduction in agricultural production (nutmeg, pepper, mango, cashew etc)
- Depletion of fishery resources
- Sea level rise
- Increased rise of temperature increase freshwater demand many fold
- Health related problems due to increase in temperature an spreading of water borne diseases

14

Solid Waste Management

- No proper treatment of collected waste
- Gaps in collection coverage/flowing
- Waste to energy project is delayed
- Unauthorized disposal at Brahmapuram

About 200 tons of waste are daily back from KMC alone

15

Deterioration of Urban Canal System

Kochi estuary is a network of canals
There are 18 canals crisscrossing within the 90 sq kms of Kochi Corporation area alone.
Many of them were commercial arteries of this area and used for inland transport
Arrival of rail and road made these canals as dump sites of sewage and wastes
Severe health issues arise due the deterioration of these canals
Kochi being a coastal city its revival can be achieved only through the rejuvenation of these canals to liveable levels

16

Unsafe Sanitation

- Lack of sewerage system
- Septic tanks not working properly
- Storm drains turned into sewage drains
- No proper system for septage treatment

17

Proposed Projects

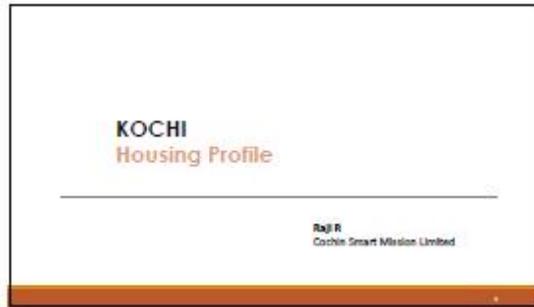
- NON-CONVENTIONAL ENERGY SOURCES
- REVAMPING THE CANALS

18



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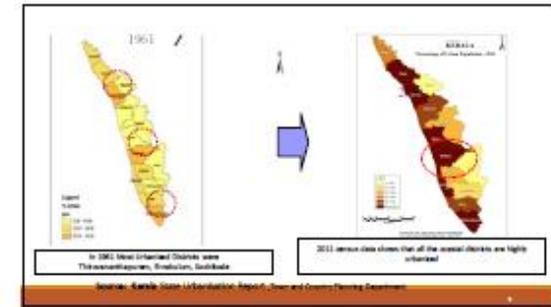
Kochi Housing Profile



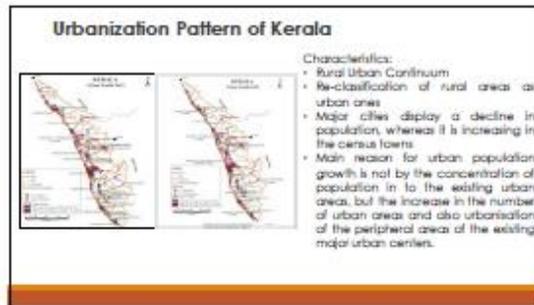
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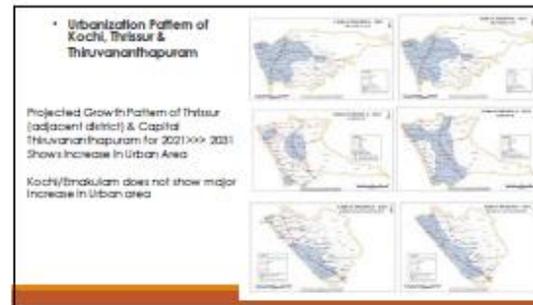
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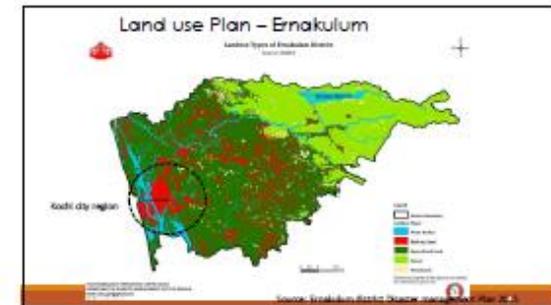
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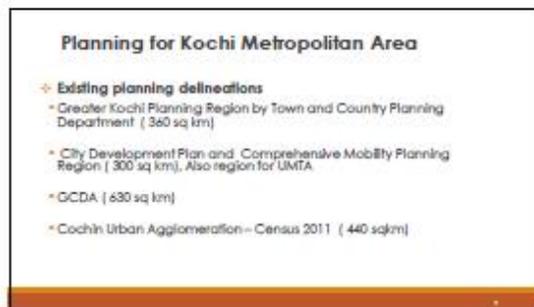
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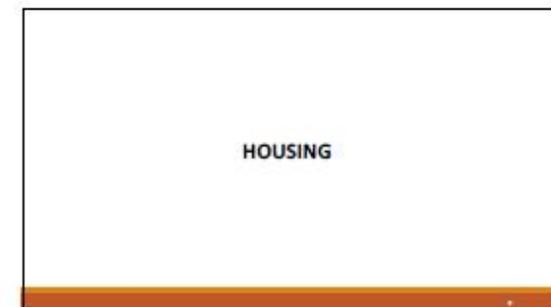
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8



9

Housing Scenario in Kerala

Residential settlement pattern in Kerala is characterized by single unit in single plot typology leading to scattered settlement pattern hence adds to the pressure on land.

	Density
India	302 person/ha/m
Kerala	857 person/ha/m

Total Residential Units available in the State	7.45 mn (No of households 7.85 mn)
Vacant Houses in the State	1.19 mn
Street Sweepers	3195 persons (1397 migrants)
% Unoccupied Houses in India	7.2% (Govt Housing)
% Unoccupied Houses in India	10.6% (Pvtl. Houses in middle income and Higher income group)

10

Housing Typology

Scattered settlement pattern low rise low density residential areas



Single family units on single plot

- Individual houses on individual plot
- Multifamily Dws (Apartments)

11

Housing Typology

Marine drive Cochin, HIG housing units



Emerging suburb - Kakkanada, Kochi

Low rise high density clusters of DWS in W Kochi

12

Kerala Housing Pattern

Housing in Kerala characterized by homelead settlement pattern

HOUSING TYPOLOGY



- Individual houses on individual plot
- Multifamily Dws (Apartments)

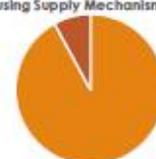
HOUSING SUPPLY



- Private Housing
- Social Housing

13

Housing Supply Mechanism



- Owned Construction
- Private Builders

14

Vacant Housing Scenario in Kerala

As per KSSP there are 11,89,144 vacant houses in Kerala

No of Rooms	No of DUs	%
Six Rooms	57272	4.82
Five Rooms	73975	6.23
Four Rooms	290658	24.47
Less than 3 Rooms	867239	72.47
TOTAL	1189144	100.00



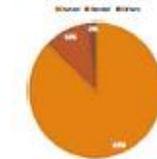
- Rural
- Urban

15

Ernakulam Housing Profile

- Population of Ernakulam (Dist): 32.82 lakhs (3.28 Mn)
- Residential Units Available : 0.79 mn

OWNERSHIP PATTERN



Source: Census of India 2011

16

Housing profile in Kochi city region

- Area under residential land use - 53%
- Average households - 0.39 mn
- As per City Development Plan - 34% of families live below Poverty Line
- Housing shortage among LIG and EWS

17

Social/Public Housing Programmes in Kochi (Kerala)

- Govt Schemes
 - Previous schemes - NSDP, VAMBAY, BSUP/IHSDP, RAY
 - Ongoing Schemes - PMAY
- Govt schemes
 - Previous Scheme- EMS Housing Project
 - Ongoing scheme -LIFE Mission
- Projects under State Plan Fund initiated by local body
- Night Shelters for pavement dwellers

18

Housing demand and projects in KMC (EWS)

Current Deficit in Housing

- ❖ Incomplete houses , requires improvement – 79
- ❖ Land less homeless - 12910
- ❖ Homeless with own land -10512

Ongoing projects

- ❖ Beneficiary Led Housing Support under PMAY - 9610
- ❖ Multifamily Dwelling Unit construction (RAY) - 800
- ❖ Slum Improvement Projects under (CSML) – 54 units

Source: PMAY/LIFE Survey 2017

19

Pradhan Manthri Awas Yojana

- ❖ Launched in 2015 by GoI
- ❖ Coverage – All statutory and census towns
- ❖ Objective – Housing for All and enables housing supply through
 - Beneficiary Led Housing,
 - Slum Improvement projects
 - Rental and affordable Housing project
 - Credit Linked subsidy to LIG

20

LIFE Mission

- ❖ GoK Initiatives
- ❖ Coverage – All urban and rural settlements in Kerala
- ❖ Housing Support to
 - Financial support to completed the partial housing/reconstruction of dilapidated houses
 - Financial support to home less with land for housing construction
 - Multifamily Dwelling Units for landless and homeless

21

Housing scenario in Kochi Metropolis

Private supply of Housing (HIG/MIG) Real estate Market

- ❖ Kochi city region accounts for 47,858 apartment units in 494 residential projects.
- ❖ Two most popular areas for homebuyers are Marine Drive and Kakkanad.
- ❖ **Luxury housing projects make the Marine Drive** with the average apartment price in the area is about INR 8,000 to 11,000 per square feet.
- ❖ **Affordable residential projects are** concentrated around the Kakkanad (35%) area while 60% of the total supply is around the peripheral city area comprising Kakkanad, Aluva, Nedumbassery, Kalamassery, Vazhokala, Tripunithura etc.
- ❖ Push factors – IT Parks, SEZs, District Head quarters , Availability of Land

Source: "Unravelling Kochi Real Estate: A Study on Kochi, Thiruvananthapuram, and Thrissur" Feb 2019

22

Challenges in Kochi region

- ❖ As per the CREDAI , Real estate demand declined (15-20%) in Kerala since 2019
- ❖ Reasons for decline in private housing demand
 - Demolition of residential flats at Maradu in Kochin the order of Supreme Court for violation of Coastal Zone Regulation (CZR) rules too has impacted the sales.
 - Demand for rental housing struck during covid .
 - Flooding along the Peyerar river , 2018
 - Job crisis in Gulf (Close to 50-60% houses were bought by NRI's for investment purpose)
 - Delay in delivering the housing units
 - Housing supply higher than the demand
 - Availability of affordable land and quality residential units in adjoining growth centers (Thiruv. Kollayam etc)

23

Institutional Support for housing

- ❖ Private housing – Owner/ Builder Led construction and prior approval to be obtained from the Local Body
- ❖ Social Housing – Promoted by the Government /NGOs
 - Financial support to the beneficiaries (with land tenure) identified through CBO (Kudumbashree) and approved by the Local Body
 - Local Govt led Multi Family Dwelling Units/ Slum Improvement projects
 - Housing construction led by

24

Challenges in Universal Housing -Kochi city

- ❖ Scarcity of developable land and high land price , Lack of land use data bank.
- ❖ Organically grown settlement of EWS are high density clusters and lacks of tenure security, limited access to basic services
- ❖ Dilapidated buildings in the settlements of EWS needs to be replaced
- ❖ Increase in migrant population and lacks rental homes.
- ❖ Lacks supply of affordable housing for MIG
- ❖ Vacant houses among luxury category
- ❖ Frequent flash flood in the MIG residential areas, lacks access to sewerage systems and narrow roads

25

Challenges in Universal Housing -Kochi city

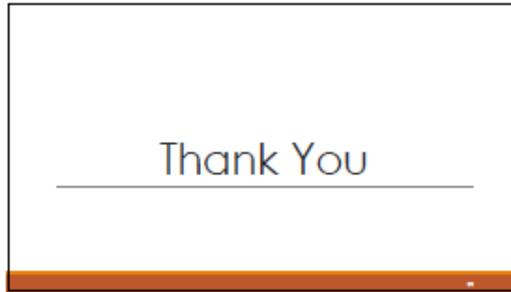
- ❖ Unoccupied houses and demand for affordable housings units
- ❖ Increase in the cost of construction and building materials
- ❖ Shortage of skilled staff and not familiar with low cost/alternate technology
- ❖ Land less EWS have limited access for housing finance
- ❖ Administrative delay for building approval

26

Way forward

- ❖ Settlements around Kochi are organically grown, for regulated housing development shall adopt strategies
 - Green field Development (High density development based on the demand, land suitability and affordability)
 - Upgradation of existing housing units
 - Reconstruction of dilapidated houses and to promote high density clustered development

27



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Kochi Mobility Lab



Mainstreaming Resilience in Metropolitan Planning - Kochi

Sector: Mobility

Presenter - Thematic Group on Transport
 Mr. S.G. James, Urban Transport Authority (Kochi, 2012)
 Mr. Suresh Kumar Pillay, Coimbatore, 2016
 Mr. Anandaram, Special Project Coordinator, 2017
 Mr. Suresh Kumar Pillay, 2018
 Mr. Suresh Kumar Pillay, Transport Planner, 2019
 Mr. S.P. Anand, AECB (2016-18 Transport), Kochi, Kerala

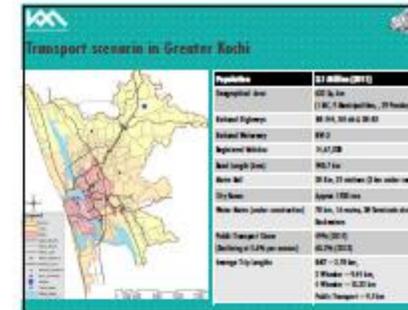
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Kochi - A Global City

- Kochi, known as *Queen of Arabian Sea* is the largest city in the state of Kerala with a population of 3.1 million.
- Ranked 4 in the Smart Cities Challenge by the Union Govt.
- Kochi was found to be among the emerging 447 global cities that will contribute 50% of the world GDP by the year 2025, in a study done by McKinsey Global Institute.
- Factors: Arabian sea, Natural Harbour, Cochin Shipyard, Port Trust, Shipyard, Special Zone, Cochin Transporter Terminal, Specialized General Gas Terminal, Info Tech, Smart City
- Kochi ranked the 4th best amongst all Indian cities according to a survey conducted by the Nielsen Company.
- High literacy rate of 93.04 - It has number of prestigious educational institutions for medicine, arts, commerce & engineering.

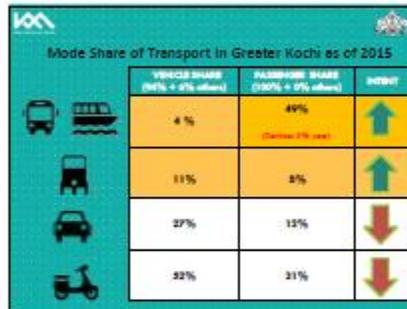
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Transport scenario in Greater Kochi

Parameter	2011	2031 (2011)
Population	2.1 million (2011)	3.1 million (2031)
Employed Area	100 sq. km	150 sq. km (100 sq. km + 50 sq. km)
Employed Population	80,000 (2011)	1,20,000 (2031)
Employed Area	100 sq. km	150 sq. km
Employed Population	80,000 (2011)	1,20,000 (2031)
Employed Area	100 sq. km	150 sq. km
Employed Population	80,000 (2011)	1,20,000 (2031)
Employed Area	100 sq. km	150 sq. km
Employed Population	80,000 (2011)	1,20,000 (2031)

3



Mode Share of Transport in Greater Kochi as of 2015

Mode	VEHICLE MODE (20% + 2% urban)	PASSENGER MODE (70% + 2% urban)	TREND
Public Transport	4%	49%	↑
Private Transport	11%	8%	↑
Car	27%	13%	↓
Two-wheeler	32%	21%	↓

4

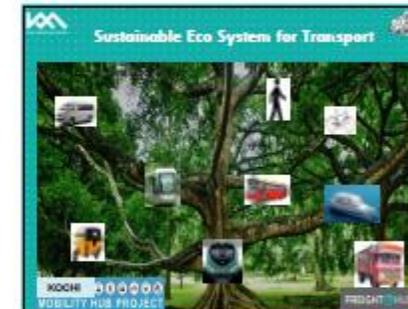


The Solution is Integrated Public Transport...

SEAMLESS TRANSPORTATION FOR KOCHI

One Network...
One Timetable...
One fare.....

5



Sustainable Eco System for Transport

KOCHI MOBILITY HUB PROJECT

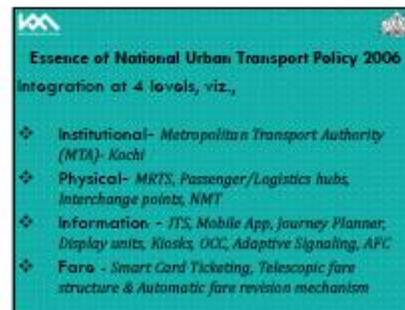
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GREATER KOCHI'S PREPAREDNESS FOR TRANSFORMING PUBLIC TRANSPORT

- METRO RAIL** - Operative since June 2017, 4000 Passenger Trains/Day
- WATER METRO** - World's 3rd largest Water Transport system - Continuous expansion of Water Transport system of Kochi City, covering 70 kms for next 10 years.
- COMPREHENSIVE MOBILITY & PARKING MASTER PLAN** - Transport Vision Plan for next 25 years - Comprehensive including Integrated Public Transport Plan and Non-Motorized Transport Plan (circular route) with network of integrated three levels: Street, Primary, and Major Transport System (ITS), Urban Traffic Control System (UTC), Automated signaling, Mobility Hub and ITS Integration of both Transport Network.
- METROPOLITAN TRANSPORT AUTHORITY** - Creation of Kochi Metropolitan Transport Authority (KMTA), an authority body responsible for Seamless Transport is operational since 2012 but a single agency responsible for planning, coordination, integration, management and regulation of both/transport system.

7



Essence of National Urban Transport Policy 2006

Integration at 4 levels, viz.,

- Institutional** - Metropolitan Transport Authority (MTA) - Kochi
- Physical** - MRTS, Passenger/Logistics hubs, Interchange points, NMT
- Information** - ITS, Mobile App, Journey Planner, Display units, Kiosks, OCC, Adaptive Signaling, AFC
- Fare** - Smart Card Ticketing, Telescopic fare structure & Automatic fare revision mechanism

8



Integration at Institutional level

- June 2017 - Govt Order on Kochi-MTA
- April 2018 - First Draft Bill to Govt of Kerala
- 2017 - Bill Passed by Legislative Assembly
- April 2018 - Act in force

9

Studies Undertaken

- Comprehensive Mobility Plan & Master Parking Plan for Greater Kochi (Including Parking Policy)
- Integrated Public Transport Solution for Greater Kochi Region
 - Bus Route Rationalisation Plan & Feeder Network Plan
- Non-Motorised Transport Master Plan for Kochi City
 - Public Bike Sharing, Walkways, Junction Redesign & Public open space
- Integrated Water Transport for Kochi (Water Metro)
 - Work Commenced in June 2016

10

Water Metro (2016-2020)

- World's 2nd largest WTS
- Integrated Marina
- 15 routes, 36 Jetties, 78 route km
- Aluminium Alloy Hull, Hybrid Propulsion, AC boats, 15-22 Kmph speed.
- ITS, APC, Operators Control Centre.
- Floating Pier for level Boarding
- Renewal of 100 km rural road
- Coastal



11

City Bus Integration

- 1500 Buses – 1000 private and 500 State run
- 69 buses per lakh population within the Greater Kochi Region
- Notorious for over-speeding
- Safety at risk
- Lack of terminal and depot space
- Modal share of city bus transport would increase from 45.2% in 2015 to 50.1% in 2017 and 53.3% in 2026

KMRL facilitated integration of private buses into a society/LLP

The move is expected to improve organisational output as well as passenger reliability and comfort

12

City Private BUS Integration-1000 Buses (Completed in June 2017)

Societies may put brakes on blood-spilling on city roads



- Kochi Wheels United LLP
- Muziris Bus LLP
- My Metro Bus Services LLP
- Profitechika Transport Operators Organization Pvt. Ltd.
- Greater Kochi Bus Transport Association LLP
- Perfect Bus Metro Services LLP
- Kochi Metropolitan Transport Co-operative Society Ltd.

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Empowering Autos in to Integrated PT Network

City autos to come under one umbrella

KMRL to bring autos in the city under one roof

City auto-riders to offer 'smart ride'

Now, auto unions to form company



14

Empowering Autos in to Integrated PT Network

Kochi Autorickshaw Drivers Co-operative Society Ltd

7 Auto drivers trade unions have formed a Co-operative Society for Integrated Auto operations.

PT feeder services, Auto Hubs & Auto Rental

Head Bank prepared by Auto Society, advised by Cochin University of Science & Technology

Auto Hubs as terminals & employees of society.

Water Social status, IPH SS, insurance benefits.

Multi-level Operating Costs

Water empowerment through Social Inclusion Initiatives

Auto Feeder are being supported by electric auto-compasses in the first phase

Society has agreements from leading of E-Autos from 2 Manufacturers



15

Panampilly Nagar Walkway (Completed in June 2016)



16

SMART CARD TICKETING



India's First Open Loop Contactless Bank Card (One Nation, One Card)

- Launch in Metro – 17th June 2017.
- Private Buses – 300 Hsa 08 March 2020.
- KMRTC & SWTB – Planning Stage.

17

PROJECTS UNDER CONSIDERATION

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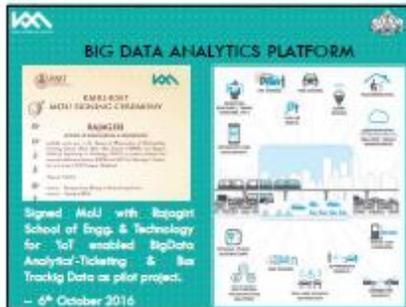
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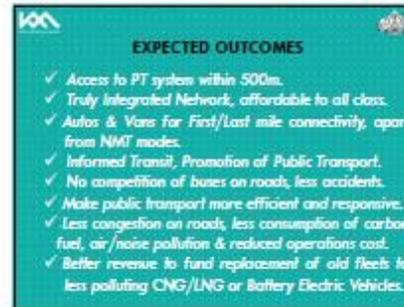
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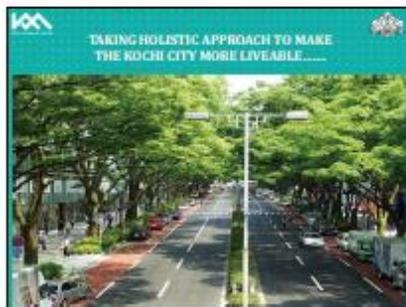
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Annexure 5 - Presentations from Day 2

Kochi Metropolitan Structural Synthesis by Pedro B. Ortiz



My warmest thanks to both **Participants and Fellows**, under the direction of the **Team Leaders**, for the enormous effort made along this week and the **exceptional results achieved**.

Mega-Kochi
Metropolitan Structural Synthesis

Kochi Metropolitan Structural Synthesis
260425 Pedro B. Ortiz Kochi Metropolitan Web-Lab



Integrated Sectorial Proposals : Continuous Sectors

Mixing Green - Blue Linkages



Proposed Mass transit corridors with primary road network





Integrated concepts:
Transversal synergies and multiplier effect
Conceptual compatibility

Environment:

- Waterways/extended protection
- Transversal continuous connectivity
- Multifaceted integrated ecosystem

Transport:

- Connector Rail based Metroplex
- Flexible public transport highways
- Airport facilities expansion
- New Freight Port

Integrated Sectorial Proposals: Discontinuous Sectors



Resilient:

- Strategic Intermodal IJC priority location
- Political negotiations for final assignment
- Environmental compatibility



Productive Activities:

- Transport highest multimodal rank locations
- Industrial Base economy Jobs
- Commercial retail metropolitan compatibility



Social Facilities:

- Health Care locations: Maximum access
- Political negotiations for final assignment
- State-Metropolitan/Municipal-Local link

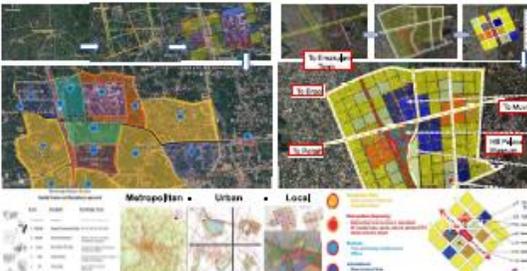
Cross sectorial Synergies



Key notes:

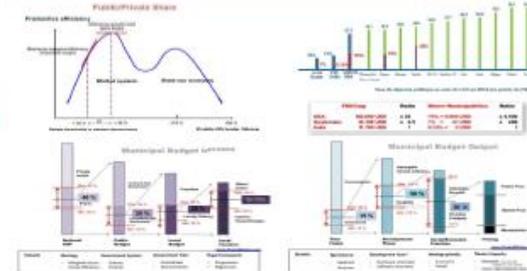
- Accounting synergy relation on working urban fabric: Compatible with Social Facilities, and from Environmental Strategy needs
- Waterway bus routes for IJC Social Facilities and extensive water access
- Urban structure for spatial expansion for new social facilities, production Green and housing production
- Urban structure for IJC Social Facilities and extensive water access

Dialogue of scales: from Metropolitan to Local



Metropolitan • Urban • Local

Metropolitan Finance



Financial indicators and budget breakdowns.

Metropolitan Governance

The United States/States

State	Metropolitan Governance
California	60%
New York	30%
Illinois	5%

Metropolitan Governance Alternatives

Alternative	Percentage
Subsidiary	60%
Federal	30%
Secretary	5%
Centralized	5%

Metropolitan Governance



Metropolitan Management: Urban Services

- Metropolitan Transport Authority
- Metropolitan Environment Authority
- Metropolitan Social Facilities Authority
- Metropolitan Development Authority
- Metropolitan Housing Authority

Government:

- Unitary Delegated
- Federal Decentralized

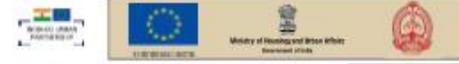
Accountability:



Housing Sector




Housing Sector
200818-200826 Kochi Metropolitan Weblab


Sector Title: Housing
Name of the Team Leader: Raji R
Team Members: Nisa, Anthe Mohandas, Rby Rachel Mathew, George
Fellows: Siddharth Krishnamoorthy, Sovanya P S, Arvind Inamdar

Project Title: Model Housing Proposal and TOD

Abstract of the Project
Kochi metropolis is going to grow by 2 million population in 30 years up to 6.4 million in 2050. The family size is going to be reduced as result of the urbanization social adaptation phenomena it will move from the original 2001 5.5 members per family, to the actual 4.5, twenty years later, to a 3.4 in 2051.
The 6.4 million population will require 2.1 million dwellings in 2050, against the actual 0.8 million stock. 1.3 million new dwellings.
The location of these dwellings should be prioritized around the Mass Public Transit System highest rank mode intermodal stations. Commuter Rail in the case of a Metropolis.



Population and Housing statistics for Kochi Metro region

	2011		2020		2050	
	Households	Population	Households (4.5)	Population	Households (3.4)	Population
Kochi Urban Agglomeration	828,288	2,119,724	356,000	2,511,002	1,076,088	3,658,732
Ernakulam District	816,011	3,282,388	364,062	3,888,280	1,666,376	5,668,536
Kochi Metro Region	828,283	3,721,650	370,065	4,405,507	1,666,386	4,133,251

Kochi Metro region
Kochi Actual population: 3.72 million (2011)

Data for Land Allocation

- Total Dwellings to build (land to allocate) in the difference between 2050 minus 2010 = 1,309,582 (=1,309,500)
- Total Population in 2050: 4.4 million
- Total Population in 2010: 3.72 million

Households and Dwellings

- Total Actual families: 279,888 (2010) at HH size =4.5
- Total Actual dwellings: 779,658 (per HH 200,000)
- Total Families in 2050: 1,666,282 at HH size =
- Total Dwellings necessary in 2050: 1,666,282 x 200,000 =

Land area Required

- Land required to build 1,309,582 at 60000/ha =
- 21,826 Ha (218 ac. km)
- Desired density of TOD Urban centrality = 40000/ha
- Area required per TOD = 14000 Dwellings = 233 Ha 2,096,280

Housing Demand in the Urban Units

Unit No	Area (sqm)	Population (2011)	Population (2050)	Population (2050) - (2011)
1	1000	1000	1000	0
2	1000	1000	1000	0
3	1000	1000	1000	0
4	1000	1000	1000	0
5	1000	1000	1000	0
6	1000	1000	1000	0
7	1000	1000	1000	0
8	1000	1000	1000	0
9	1000	1000	1000	0
10	1000	1000	1000	0
11	1000	1000	1000	0
12	1000	1000	1000	0
13	1000	1000	1000	0
14	1000	1000	1000	0
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93	1000	1000	1000	0
94	1000	1000	1000	0
95	1000	1000	1000	0
96	1000	1000	1000	0
97	1000	1000	1000	0
98	1000	1000	1000	0
99	1000	1000	1000	0
100	1000	1000	1000	0

The map shows the housing demand per Urban centrality bringing about a population of 50000 in each of the centralities identified.

Pre-Design of 5 centralities as Proposed TOD has been considered.



~ 3000 houses

TOD design proposal- 1. Koratty, 2. Nedumbassery- Airport

Centrality Influence area Structure of the TOD



Area: 100 Hectares | Location - Koratty



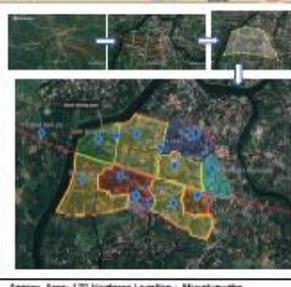
Approx. Area: 100 Hectares Location - Nedumbassery- Airport

TOD design proposal- 3. Ettumanoor 4. Muvattupuzha

Centrality Influence area Structure of the TOD



Approx. Area: 150 Hectares - Location - Ettumanoor



Approx. Area: 170 Hectares Location - Muvattupuzha

TOD design proposal- 5. Thripunithura

Centrality Influence area Structure of the TOD



Description of the Plan:
- Objectives: Develop an Urban centrality to stimulate population growth and attract development
- Area: 300 Hectares
- Location: Thripunithura Station

TOD design

- Social facilities: Nearby center and axis of TOD
- Intermodality (Bus/Metro) + Commuter train station
- Central green adjacent to Modality
- Social Reference point: Historical Monument

Physical Solutions

- The blocks are designed around the Metro-Commuter
- Transit Modality
- Equal access to the commuter hub
- Central and peripheral commerce
- Prominent axes form the structure of the TOD

Financial and Management proposal

MANAGEMENT PROPOSALS:

- Public-Private Partnership (PPP)
 - Build-Operate-Transfer (BOT) ...
 - Build-Own-Operate (BOO) ...
 - Build-Own-Operate-Transfer (BOOT) ...
 - Build, Own, Lease-Transfer (BOLT)
 - Design-Build ...
 - Design-Build-Finance ...
 - Design-Build-Finance-Operate (DBFO) ...
 - Design-Construct-Maintain-Finance (DCMF) ...
 - O & M (Operation & Maintenance)
- Land Pooling Schemes
- Town Planning Schemes
- Regulation of Land Values, FSI, etc

FINANCIAL PROPOSALS:

- Public-Private Partnership (PPP)
 - Cost Recovery
 - Commercially Viable Projects
- Market Instruments
 - Banks
 - Financial Institutions
 - Municipal Bonds
 - Credit rating
- Wealth Land Tax
- Building License Fees
- Encroachment Fees
- Parking Fees
- Betterment Charges

Social Facilities



OVERVIEW OF SOCIAL FACILITIES
200818-200826 Kochi Metropolitan Weblab



Sector Title: Social Facilities

Names of the Team Leader: Dr. Pedro B. Ortiz, Dr. Nirmla Padmanaban

Team Members: Mr. Chelvarajah, Ms. Sujya, Dr. Sheela Sreedevi, Dr. Rajeev Jayaraman, Ms. Anandhi Murali, Ms. Anji, Mr. Shivaprasad

Fellows: Shrawan Acharya, Mahirika Arora, Riyazul Sanad Binochamma

Project Title: Scenario of Social Facilities in Kochi Metropolitan Region

The project deals with analysis of high order educational and medical facilities to understand the existing social sector in the Kochi metropolitan region and identify the areas where investment is required to achieve balanced and comprehensive development of the region.

Summary

Kochi Metropolitan Region is rich in social sector in terms of superior educational and medical facilities. The aim of this project is to understand the significance of the region in social sector. Additionally by 2050 when the scale of urbanization and migration will be at its peak, it is important to understand how the present social facilities are serving the region. A balanced distribution of these facilities is important for sustainable community development. Since, the region specializes in Ayurvedic specialized hospitals and educational institutes hence analysis of the same is required.



Sector Situation - Educational Facilities

Observations

- The city is situated at the western coast and a strategic location
- Most of the higher educational institutes are situated at the Kochi city center and scattered towards the eastern area of Metropolitan region
- Technical Institutes, Universities, Cultural Colleges, Language schools, Maritime Institutes and Law schools are predominantly present in the city center
- As the population density is less in the inland area, hence educational institutes are present in singular numbers.

Classification of Higher Educational Infrastructure in Kochi Metropolitan Region



Figure 1 shows Area-wise density of institutions.
Figure 2 shows area-wise density of population



Sector Situation - Medical Facilities

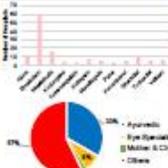
Scenario

- The concentration of best medical facilities is around Kochi City and the Ernakulam taluka of Ernakulam district.
- As the distance from Kochi Centre increases the concentration of High Order Medical Facilities tends to weak.
- The northern part of the Metropolitan Region is also rich in Ayurvedic medical facilities in contrast to southern and eastern part of the region.
- Taluka such as Perur, Pala, Kottamangalam and Perumbavur lack high order medical facilities in comparison to neighboring taluka.



Causes

- Kochi act as the magnetic center for many private multi-specialty hospitals
- Specialized hospitals such as Eye Care, Ayurveda, Mother & Child are located along the existing mass transit corridors or urban nuclei centers.
- The urban influence and good connectivity towards Thrissur district has also contributed to the emergence of superior medical facilities in the northern region.




Sector Situation - Old Age Homes & Different Age Group

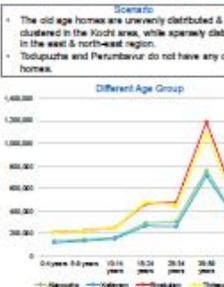
Scenario

- The old age homes are unevenly distributed & clustered in the Kochi area, while sparsely distributed in the west & north-east region.
- Talukuru and Perumbavur do not have any old age homes.

Old Age Home Locations



Different Age Group




Integrated Proposal & Sector Quantified Solutions

Physical Solutions

- Investment along the two directionalities which show deficient educational services
- Investment in terms of improved accessibility in southern part of proposed metropolitan region (Alappuzha and Kottayam District) to negotiate the future demand of the Educational facilities.
- Increased momentum towards ayurvedic medical facilities in Pala, Vellam, Kottamangalam.
- Technical Educational Institutes can be proposed on western belt as highlighted by yellow pockets with least number of facilities.

Complementary Policies

- Audram Mission focused at creating "People Friendly" Public Health Delivery System.
- National Health Mission
- Education Mission of Kerala Govt
- National Policy on Education, 2020
- Dist Health Policy Kerala, 2013

Desired Medical Investment Zone

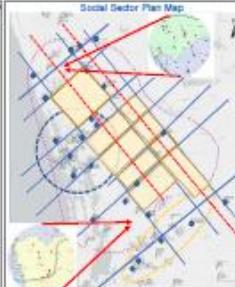
- Desired Educational Investment zone
- Potential Pockets

Objectives:

- To Balance the distribution of medical & educational facilities taking into consideration expected growth of metropolis
- High Order Specialized Medical Facilities
- Solutions
- Investment in Modern Medical Facilities in Eastern Region due to locational context
- While investment in Ayurvedic facilities in north-eastern region is required for balanced distribution.

Proposals

- Education & Medical services investment along two directionalities 2050 for a self sustainable Metropolitan region
- Location
- Perumbavur, Pala, Vellam




Project Typology and Location Strategy

Abstract

Project selection criteria

- Benefits**
 - Triggering social sector uplifts the overall growth of population
 - Add life to urban population
- Triggering effects**
 - Social sector upliftment gives an impulse to sustainable growth
 - All metropolitan region balanced distribution of services required to overcome time & distance attributes.
 - As visible from mushroom model, health & education form the basic needs for human capital.
 - Acting as link between metropolitan region & productive sector advancement

Understanding Metropolitan Social Infrastructure And its Interdependency on the regional setup.



Project Typology

- Integrated medical facilities covering both modern & ayurvedic hospitals.
- Educational facilities to complement & support projected production facilities of the metropolis in 2050

Project Design Description

Institutions involved for social approval

- Health & Family Welfare Department, Government of Kerala
- Department of Higher Education
- Tourism & Industries Department, Govt. of Kerala
- Kerala State Higher Education Council
- Directorate of Technical Education
- Director of health services

Why ahead

Sector Planning Development

- Production Sector - Tourism & Industries
- Government Vision
- Education Sector (all stakeholders)
- Health Sector



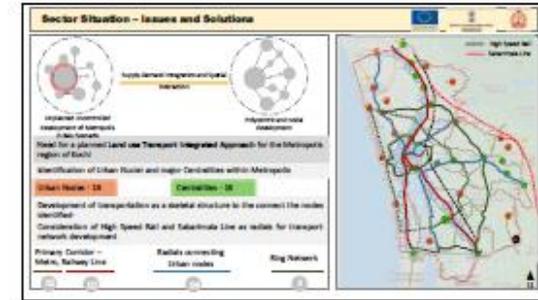
Transport



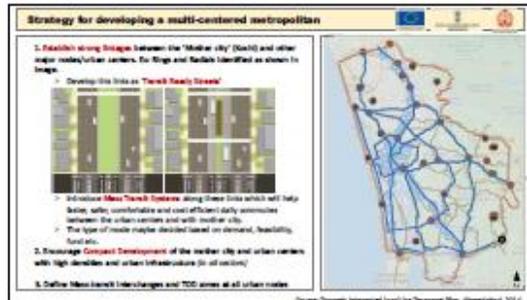
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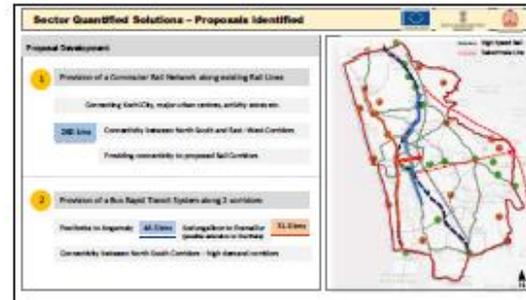
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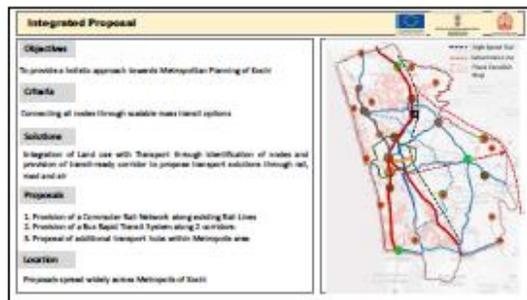
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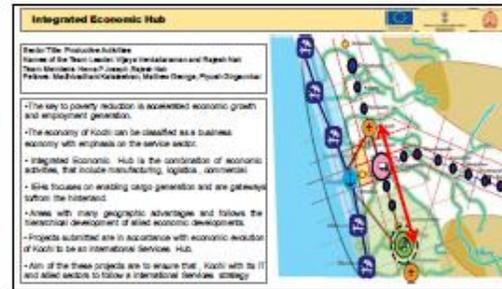
Productive Activities



Productive Activities

200815-200825 Kochi Metropolitan Weblab

1

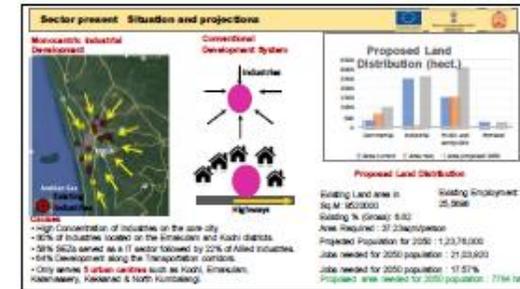


Integrated Economic Hub

Key to the Productive Activities
Name of the Team Leader: Vijaya Venkateshwaran and Rajesh Hal
Team Members: Harsh J Joseph, Rupa Hal,
Pradeep, Anu Swastika Chakrabarti, Madhu George, Pooja Durgadevi

- The key to poverty reduction is accelerated economic growth and employment generation.
- The economy of Kochi can be classified as a business economy with emphasis on the service sector.
- Integrated Economic Hub is the combination of economic activities, that include manufacturing, logistics, commercial.
- Site focuses on enabling cargo generation and are gateway to/in the hinterland.
- Areas with many geographic advantages and follows the historical development of allied economic development.
- Projects submitted are in accordance with economic evolution of Kochi to be an International Services Hub.
- Aim of these projects are to ensure that Kochi with its IT and allied sectors to follow a International Services strategy.

2



Sector present: Situation and projections

Monocentric Industrial Development

- High Concentration of industries on the city.
- 80% of industries located on the Ernakulam and Kochi districts.
- 50% SICZ sector as a IT sector followed by 20% of Allied industries.
- 60% Development along the Transportation corridors.
- City serves 5 urban centres such as Kochi, Ernakulam, Kollam/Alappuzha, Kozhikode & North Kuttanad.

Conventional Development System

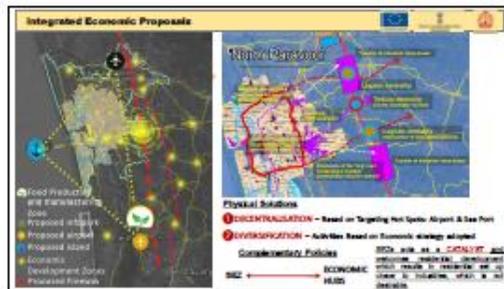
Proposed Land Distribution (hect.)

Land Use	Existing Land	Proposed Land
Industry	1000	1500
Residential	2000	2500
Commercial	500	1000
Green	1000	1500
Water	500	500
Other	500	500

Proposed Land Distribution

Existing Land area in Sq. M: 50,00,000 Existing Employment: 25,00,000
 Existing No. (Sector): 5:50 Area Required: 37,20,00,000
 Projected Population for 2050: 1,23,78,000
 Jobs needed for 2050 population: 21,03,600
 Projected area needed for 2050 population: 7766 ha

3



Integrated Economic Proposals

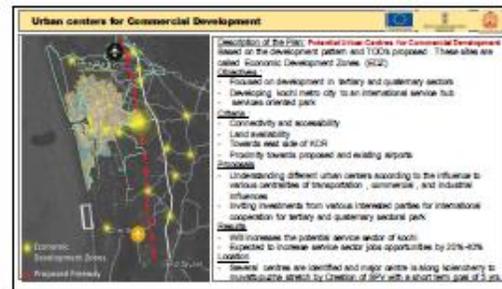
Physical Solutions

- DECENTRALIZATION** - Based on Targeting New Spine, Airport & Sea Port
- CONCENTRATION** - Activities Based on Economic strategy adopted

Complementary Policies

2020 - 2030 - 2040 - 2050 - 2060 - 2070 - 2080 - 2090 - 2100

4



Urban centers for Commercial Development

Description of the PSC: Proposed Urban Centres for Commercial Development
Based on the development pattern and TODs proposed. These sites are called Economic Development Zones (EDZ)

Objectives:

- Focused on development in tertiary and quaternary sectors
- Developing Kochi into city to an international service hub
- Service oriented park

Advantages:

- Connectivity and accessibility
- Land availability
- Towards sea side of KCR
- Proximity towards proposed and existing airports

Proposals:

- Understanding different urban centers according to the influence to various activities of transportation, commercial, and industrial influence
- Inviting investments from various international parties for international cooperation for tertiary and quaternary sectors park

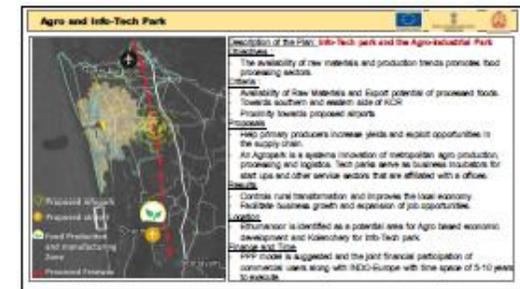
Outcomes:

- Will increase the tertiary service sector of Kochi
- Expected to increase service sector jobs opportunities by 20% - 40%

Location:

Tertiary centres are identified and major activity is along secondary to transportation activity by creation of SPV with a short term goal of 5 yrs.

5



Agro and Info-Tech Park

Description of the PSC: Info-Tech park and the Agro-Industrial Park

Objectives:

- The availability of raw materials and production trends promote food processing activities
- Availability of raw materials and Export potential of processed trade
- Towards southern and eastern side of KCR
- Proximity towards proposed airports

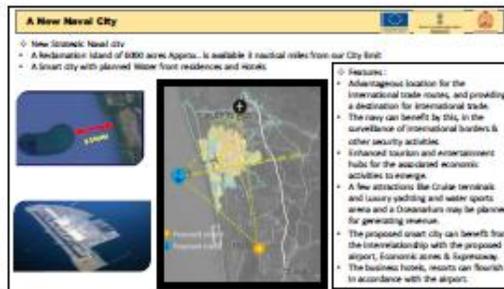
Advantages:

- Help primary producers increase yields and export opportunities in the supply chain
- An Agropark is a systems innovation of interposition agro production processing and logistics. Tech parks serve as business incubators for start-ups and other service sectors that are affiliated with a office.
- Control rural transformation and improve the local economy
- Facilitate business growth and expansion of job opportunities

Proposals:

- ERU/Innovator is identified as a potential area for Agro based economic development and incubator for tech-tech park
- Develop and time
- PPP mode is suggested and the joint financial participation of commercial users along with 90:10 finance with time scale of 5-10 years to sustain.

6



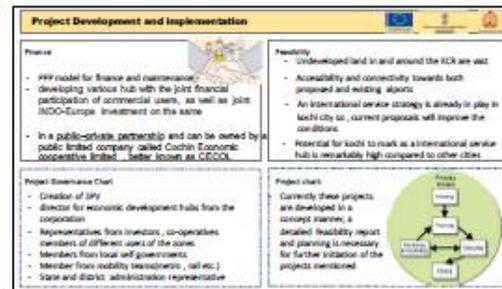
A New Naval City

- New Strategic Naval city
- A 6000 acre island of 6000 acres approx. is available 8 nautical miles from our City limit
- A smart city with planned 100000+ residences and hotels

Reasons:

- Advantageous location for the international trade routes, and providing a destination for international trade
- The navy can benefit by 50% in the surveillance of international borders & other security activities
- Enhanced tourism and entertainment hubs for the associated economic activities to emerge
- A few attractions like Cruise terminals and luxury yachting and water sports areas and a Donsarium may be planned for generating revenue
- The proposed smart city can benefit from the interrelationship with the proposed airport, Economic zones & Expressway
- The business hotels, resorts can flourish in accordance with the airport

7



Project Development and Implementation

Phase

- PPP model for finance and maintenance
- Developing vertical hub with the joint financial participation of commercial users, as well as joint IMCO-Europe investment on the same
- In a public-private partnership and can be owned by public limited company called Kochin Economic cooperative limited, better known as KECOL

Feasibility

- Underdeveloped land in and around the KCR are vast
- Accessibility and connectivity towards both proposed and existing airports
- An international service strategy is already in place in Kochi city, current proposals will improve the conditions
- Potential for Kochi to mark as an international service hub is remarkably high compared to other cities

Project Charter

- Creation of SPV
- Director for economic development hubs from the corporation
- Representatives from investors, co-operators, members of different users of the zone
- Members from local self governments
- Member from mobility management, self etc.
- State and district administration representative

Project chart

Currently these projects are developed in a concept manner, a detailed feasibility report and planning is necessary for further initiation of the projects envisaged

8

