CASE 3 GREATER THAN PARTS

Bangalore, India

Crossing Boundaries to Integrate Core and Periphery

Amartya Deb, Jaya Dhindaw, and Robin King

WORLD BANK GROUP

BANGALORE

Editors
Shagun Mehrotra, Lincoln Lewis,
Mariana Orloff, and Beth Olberding

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Disclaimer—The report contains preliminary research, analysis, findings, and recommendations. The information is circulated to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues.

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CASE STUDY 3: METROPOLITAN BANGALORE

Crossing Boundaries to Integrate Core and Periphery

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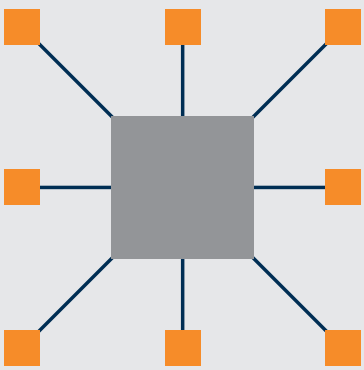

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The Synthesis Report offers a range of integrated solutions (Mehrotra 2020).

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THE SOLUTION

Crossing boundaries to integrate core and periphery

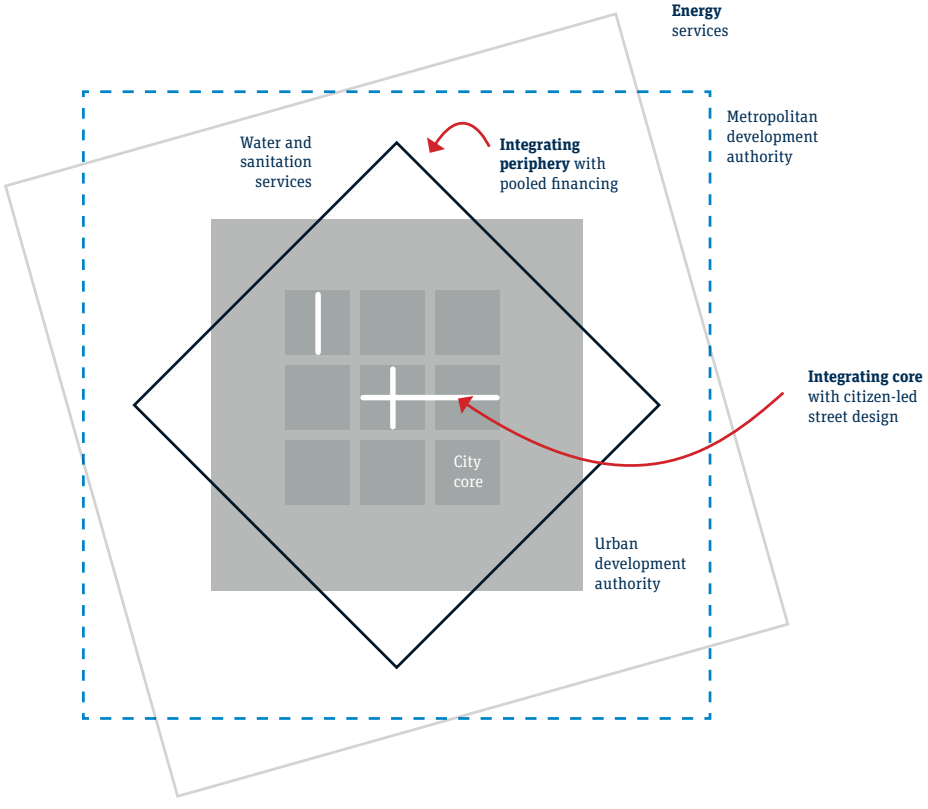


Figure 1
Integrated planning model

Source: Mehrotra 2020.

KEY FINDINGS

1 Bangalore has achieved sectoral and spatial integration at a metropolitan scale by supplementing its Masterplan with interim measures. This has strengthened its strategic capacity to accommodate rapid urban change and could be a solution for other cities with long periods between plans.

2 The Karnataka Water and Sanitation Pool Fund Trust (KWSPFT) scales the integration of water and sanitation sectors across administrative boundaries. Increased efficiency and sharing of risk enabled the fund to access market finance, while tax-free municipal bonds were used to extend piped water and underground drainage into peripheral urban areas.

3 The metropolitan-level integrated delivery of water services and complete streets highlights the potential agencies created for specific purposes can have in facilitating coordination between different sectoral silos, civil society, and the private sector. Densification, improved walkability, and last mile public transit connectivity in the city core can lower emissions while similar initiatives on the periphery can reduce sprawl.

IDEA IN BRIEF

Bangalore's rapidly expanding metropolitan periphery has a fragmented spatial growth. A multiplicity of stakeholders are involved in service delivery across the various administrative boundaries that form the metropolitan areas. Water supply and sanitation service delivery is an example of sectoral integration that demonstrates how urban local bodies (ULBS) have collaborated across their administrative boundaries withe support of state government and private organizations. Another example, of road upgrading, reveals how multiple agencies are delivering tactical urban solutions such as completing street networks.

Complementing the masterplan, this case highlights how integrated urban planning and implementation in Bangalore happens through a combination of long- and short-term initiatives, and with civil society efforts that complement traditional public sector led integrated urban planning solutions. Innovative solutions that helped implement projects include creation of nodal agencies to coordinate across administrative boundaries. A special purpose entity helps access finance through market borrowings. Bangalore continues to depend on central and state government grants to implement and scale up integrated planning solutions.

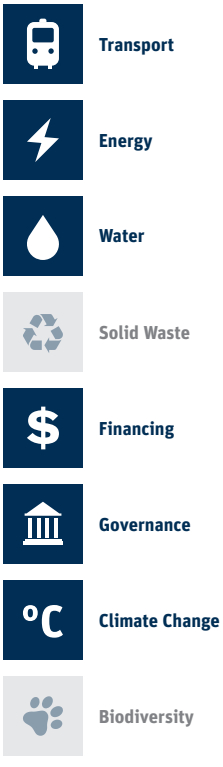
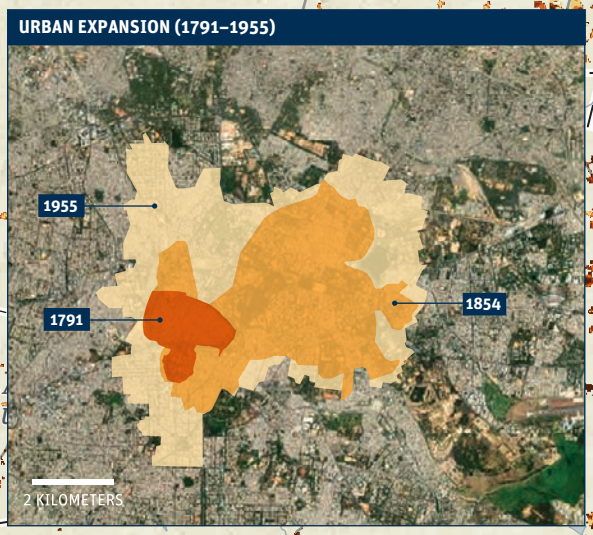


Figure 2
Sectors addressed by the case



DEVANAHALLI

CHIKKABALLAPURA DISTRICT

Kempegowda International Airport

DEVANAHALLI TALUK

BANGALORE URBAN DISTRICT

Yelahanka Air Force Station

Govindapura

Yelahanka

Sathanur

Yelahanka New Town

NELAMANGALA

BRUHAT BENGALURU MAHANAGARA PALIKE - BBMP

Thirumenahalli

Vidyaranyapura

Yakkur Airfield

Sahakar Nagar

T. Dasatahalli

Geddalahalli

Hebbal Lake

Yeswanthpur

Bangalore (1955)

Krishnarajapura

Malleshwaram

Sunkadakatte

Basaveshwar

Mahadevapura

Hoodi

Kadugodi

INDIRANAGAR

WHITEFIELD

Bangalore (1791)

Ulsal

Marathahalli

HAL Airport

Bellandur Lake

Jayanagar

Koramangala

Banashankari

HSR LAYOUT

Thippasandra

Kodathi

FORMER BANGALORE CITY CORPORATION AND BANGALORE MAHANAGARA PALIKE

Thippasandra

Kothnur

RAMANAGARA DISTRICT

JIGANI

Byromangala Reservoir

MAP 1

URBAN EXPANSION

1985–2015

Urban extent by year

1955 1985 1990 1995 2000 2005 2010 2015

Bruhat Bengaluru Mahanagara Palike (BBMP) boundary

District boundary

Taluk boundary

Primary road

SOURCES: GERMAN AEROSPACE CENTER (DLR); IDOM: NASA SRTM 30m; OpenStreetMap Contributors

5 KILOMETERS

MAP PROJECTION: UTM ZONE 43S, WGS-84 DATUM

The Metropolitan Context

BANGALORE IS THE CAPITAL of the southern India state of Karnataka.[1] Since the 1940s, Bangalore has seen two epochs of population growth and urbanization that moved it away from its traditional urban form and established global linkages (Nair 2005). First, from the 1940s to the late 1950s, several state-owned enterprises[2] were established in and around the city, devoted to manufacturing electronic equipment for defense purposes. Second, from the early 2000s, population has grown exponentially because of a national effort to attract private information technology (IT)-sector investment that has driven successful economic development.[3]

Metropolitan Bangalore contains 36 percent of Karnataka state's urban population. Between 2001 and 2011, the city saw a 35 percent growth in population. In 2007 the municipal Bangalore Mahanagara Palike corporation's jurisdiction was expanded from 226 square kilometers to 741 square kilometers by the creation of the Greater Bangalore Municipal Corporation (Bruhat Bangalore Mahanagara Palike, BBMP) (Sudhira, Ramachandra, and Subrahmanya 2007). Since 1949, Bangalore's area has increased tenfold (Sudhira, Ramachandra, and Subrahmanya 2007).

Whereas many cities grow from a dense core to less dense suburbs, Bangalore has developed pockets of dense growth on its periphery. Satellite data reveal that since the early 2000s rapid urban expansion of built-up areas has occurred in an outer ring around the city (Map 1). Each ward in the core city has a population of 21,000 to 33,000 people, while the peripheral wards have anywhere from 50,000 to 95,000 people each (Siddaiah, Ravichandar, and Yashvanth 2015). This indicates the increasing demand for service delivery to the city's periphery.

35%
Bangalore's population growth 2001–2011

[1] Bangalore was officially renamed Bengaluru.

[2] Known in India as Public Sector Undertakings (PSUs).

[3] Soliciting private companies followed liberalist policies adopted by the national government.

Since the 1990s, Bangalore has emerged as a prime hub for IT firms, attracting investment from private corporations from India and abroad. The resulting economic opportunities coupled with relatively high levels of social and physical infrastructure have been responsible for a surge of immigration into the city (Bose 2013). This growing population and commercial investment have increased the demand for land serviced by roads, utilities, and amenities. With Karnataka aspiring to move from a US$120 billion[4] to a $700 billion economy by 2035, (Pandey 2016), this demand will only increase.

BANGALORE'S URBAN AGGLOMERATION

Our study's scope is the urban agglomeration of Bangalore. The present Bangalore metropolitan area is governed by the BBMP, which was formed in 2007 by merging seven city councils, one town council, and 111 villages into a single metropolitan administrative area. However, even with this merger, the actual urban extent of Bangalore now spreads beyond the jurisdiction of the metropolitan authority (Map 2).

FINANCING AT THREE LEVELS

Bangalore is financed by three main revenue streams: the central government, the state of Karnataka, and the city's own-source revenue. Of the metropolitan authority's total revenue of $1.4 billion (9,244 crores) in the fiscal year 2017–18, more than half was raised by the municipal corporation, BBMP, mainly from property taxes and service charges (Janagrahaa 2018). Direct grants from the central government make up only 4 percent of BBMP's revenue, whereas the state government provides almost half of BBMP's revenue (Janagrahaa 2018). Although BBMP's budget for FY2015–16 shows how the elected body earns and spends revenue in sectors such as horticulture, roads, drainage, and welfare, parastatals such as the state-owned Bangalore Water Supply and Sewerage Board (BWSSB) and Bangalore Electricity Supply (BESCOM) have their own sources of revenue, so their spending in the city is not reflected in the city budget.

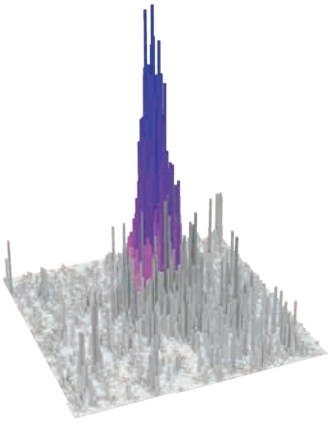
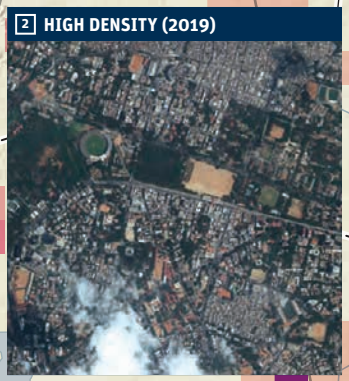


Figure 3
3D population density distribution

[4] All currency is in U.S. dollars. 1 U.S. dollar = 68.45 Indian rupees as of July 2019.



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CHIKKABALLAPURA DISTRICT

Kempegowda International Airport

DEVANAHALLI TALUK

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Hesaraghatta Lake

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FORMER BANGALORE CITY CORPORATION AND BANGALORE MAHANAGARA PALIKE

Thippasandra

Kothnur

JIGANI

Byromangala Reservoir

To estimate population density, LandScan uses remote sensing imagery analysis to disaggregate census counts within an administrative boundary. As a result, built-up areas such as airports and industry may appear to have a residential population where there isn't one.

MAP 2

POPULATION DENSITY 2017

Population per square kilometer

200 1,000 2,500 5,000 10,000 20,000

Bruhat Bengaluru Mahanagara Palike (BBMP) boundary

District boundary

Taluk boundary

Primary road

SOURCES: LANDSCAN; NASA SRTM 30m; OpenStreetMap Contributors

5 KILOMETERS

MAP PROJECTION: UTM ZONE 43S, WGS-84 DATUM

Integration

HOW INTEGRATED PLANNING IS DEFINED AND ADOPTED

AS THIS CASE STUDY HIGHLIGHTS, although the city's masterplan is the formal, legal tool for integrated urban planning, in fact integration at the metropolitan scale occurs via piecemeal planning and implementation, with the masterplan as a guiding framework.[5] Well-planned neighborhoods and industries that could be representative of integrated planning—such as Malleswaram (Map 3), Basvanagudi, neighborhoods within the cantonment area, public-sector-undertaking townships, and to some extent the IT parks—have been developed through strategic initiatives rather than drawn from a unified city vision. As the city has grown into a metropolis, complexity in power, jurisdiction, finance, and authority has also increased, making integrated urban planning even more of a challenge.

Under the Karnataka Town and Country Planning Act of 1961, cities produce a masterplan every 10 years. In the past, this instrument has helped urban local bodies align their plans with national and state priorities. But the scale of intervention through this instrument is limited. While the masterplan prepared by the Bangalore Development Authority (BDA) forms a strong foundation for regulating city development, it is not able to provide a detailed road map for development because enforcement, implementation, and revenue collection all lie with other agencies (Gopiprasad and Shankar 2016). Due to the long gaps between revisions (10 years) the masterplan has been unable to keep up with the rapid rate of urban growth (Kappan 2013). Moerover, plan preparations do not allow room for the tactical maneuvering and adjustments required in policies to respond to the challenges that emerge during these gaps.

One problem—well acknowledged by professionals involved in Bangalore's planning process—is that the agencies responsible for the city's service delivery

[5] A news article in *The Hindu* (Kidiyoor 2019) brings out that transit-oriented development policy is not a part of Bangalore's most recent masterplan, and the processes for preparing the two documents were separate; nevertheless both were submitted to the state government.

work in silos.[6,7,8] The following telling anecdote from a member of the BBMP restructuring committee, which was set up to address the present challenges of Bangalore, shares a contextual definition of integrated planning:

> "Say for example the state [Karnataka] wants to [construct] an apparel park in Devanahalli. An integrated planning process would ask where will people stay? Where will the jobs come from? How will people travel to the apparel park and back? Where is the educational infrastructure and social infrastructure for people in the area? Are electricity connections available? So integrated planning would take into consideration [issues] across the silos to make that apparel park a success, but we don't have it. We will say [instead], the apparel park is the job of the KIADB (Karnataka Industrial Area Development Board). [The KIADB will designate a] land parcel [as an] apparel park, and they magically expect all other agencies will work towards the success of this. [But] it doesn't happen [in Bangalore]"[9]

Interviewed city professionals agree that intersectoral coordination and collaboration is not the norm, but that such cross-sectoral integration is nevertheless desirable and that it occasionally occurs despite the odds.

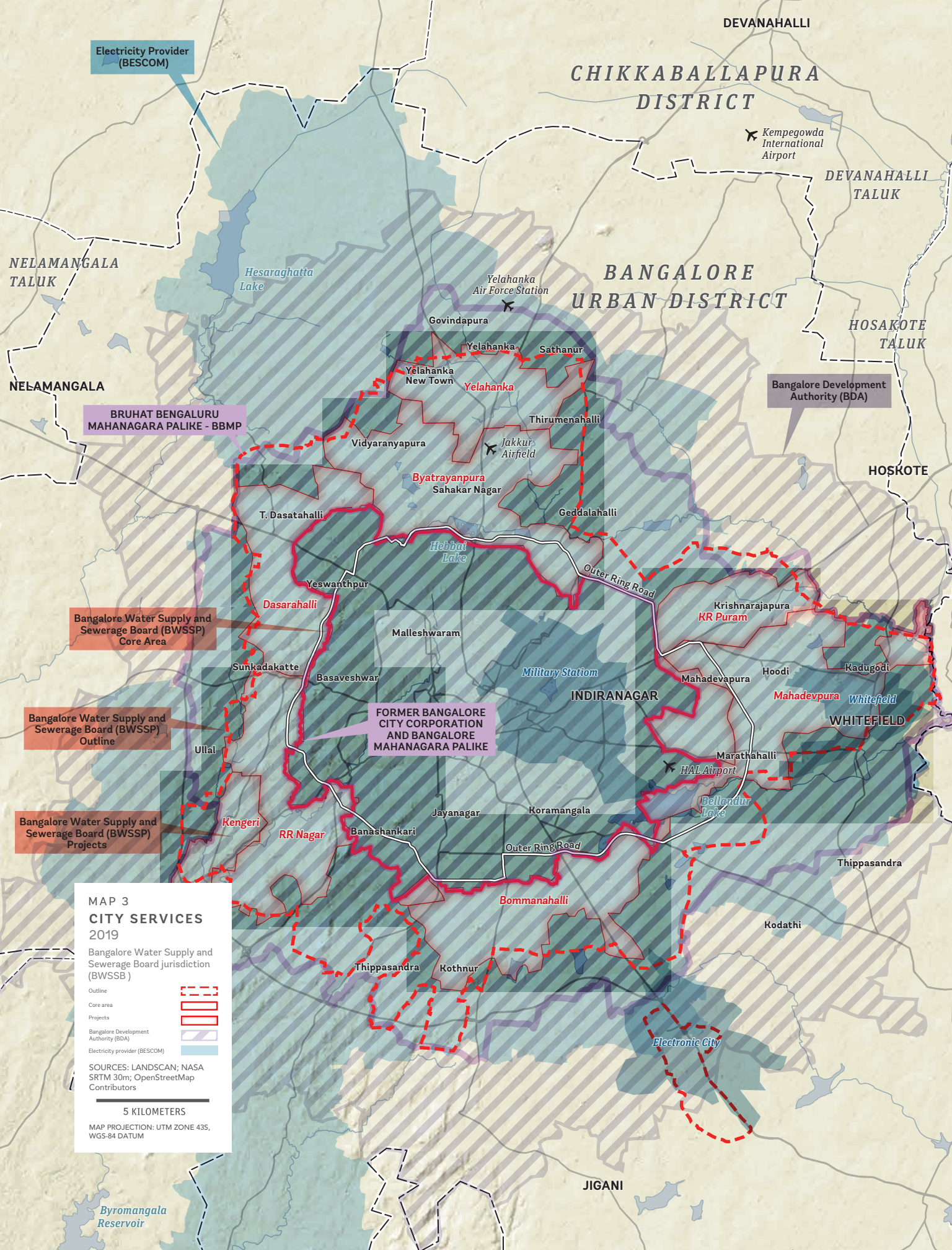
Planning in Bangalore happens in silos, and responsibilities for service delivery are fragmented among several agencies (BBMP 2017c). In the mobility sector, for instance, different government agencies have responsibilities for road construction, running the bus service, running the railways, and installing and maintaining the pedestrian infrastructure. At the same time, services that run along the roads—like electricity, water, and sewerage—are the responsibility of another set of agencies. A committee set up to

6 S. Kuchangi, Integrated urban planning in Bangalore and the Safe Access project, interview with A. Deb, Bangalore, April 16, 2019.

7 A. Nair, BBMP restructuring reports and municipal finance, interview with A. Deb, Bangalore, April 22, 2019.

8 V. Ravichandar, BBMP restructuring and integrated urban planning in Bangalore, interview with A. Deb, Bangalore, April 19, *2019.*

9 V. Ravichandar, BBMP restructuring and integrated urban planning in Bangalore, interview with A. Deb, Bangalore, April 19, 2019.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Electricity Provider (BESCOM)
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Bangalore Water Supply and Sewerage Board (BWSSP) Core Area
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Hoodi
Kadugodi
INDIRANAGAR
Mahadevpura
Whitefield
WHITEFIELD
Bangalore Water Supply and Sewerage Board (BWSSP) Outline
FORMER BANGALORE CITY CORPORATION AND BANGALORE MAHANAGARA PALIKE
Ulsal
Marathahalli
HAL Airport
Bellandur Lake
Bangalore Water Supply and Sewerage Board (BWSSP) Projects
Kengeri
RR Nagar
Jayanagar
Koramangala
Banashankari
Outer Ring Road
Thippasandra
Bommanahalli
Kodathi
Thippasandra
Kothnur
Electronic City
JIGANI
Byromangala Reservoir
MAP 3
CITY SERVICES
2019
Bangalore Water Supply and Sewerage Board jurisdiction (BWSSB)
Outline
Core area
Projects
Bangalore Development Authority (BDA)
Electricity provider (BESCOM)
SOURCES: LANDSCAN; NASA SRTM 30m; OpenStreetMap Contributors
5 KILOMETERS
MAP PROJECTION: UTM ZONE 43S, WGS-84 DATUM

evaluate the status of BBMP found that currently in Bangalore, collaboration is unlikely since agencies operate with their own guidelines and funding sources and have limited capacity and resources (Siddaiah, Ravichandar, and Yashvanth 2015).

This lack of coordination among public agencies jeopardizes the intended effects of planning and can ultimately lead to poor service delivery. The procurement of spatial data by the public agencies in Bangalore is a good example. In Bangalore, several government departments need the same spatial data sets. But in reality, each agency outsources the creation of geospatial data separately (BBMP 2017a). This leads to unnecessary replication of information and increases the costs of procurement. Moreover, data are prepared by different consultants without standardized guidelines, resulting in inconsistent and often inaccurate data sets (BBMP 2017a). Another example is land procurement, which public projects often require. A lack of coordination or cooperation between BDA, the agency responsible for land procurement in Bangalore, and other agencies has led to increases in the time and cost of projects (BBMP 2017b). For example, the peripheral ring road was envisioned in 2005, but it has yet to be realized (Lalitha 2019).

Even within the transportation area, there is little coordination between bus and metro authorities. Bus stops are not coordinated with metro stops.[10] Ridership, and thus finances, could increase with better coordination. Another challenge is duplication of services, with buses plying the same stretches as the metro rather than being allocated to less-served areas.[11] These examples suggest that lack of governmental coordination makes it impossible to optimize assets.

While in theory the masterplan (or a land use plan) is the closest representation of sectoral and spatial integration, incorporating views from all agencies and serving as an instrument to map the city's growth for the future, in reality this does not happen.[12,13,14,15,16] Instead, in Bangalore horizontal integration has occurred in at least two other ways: first, through an overarching agency bearing the responsibilities of multiple sectors as we see with Bangalore Water Supply and Sewerage Board (BWSSB) and second, through legal mandates as in the case of Tender SURE (Tender Specifications for Urban Roads Execution).

The Greater Bangalore Water and Sanitation Project (GBWASP), which planned and delivered water supply and sanitation infrastructure to the peripheral areas

10 H. Das, Integrated urban planning in Bangalore: DULT's collaboration with WRI, interview with A. Deb, Bangalore, April 11, 2019.

11 S. Maiti, Integrated urban planning in Bangalore and STAMP project, interview with A. Deb, Bangalore, April 12, 2019.

12 V. Ravichandar, BBMP restructuring and integrated urban planning in Bangalore, interview with A. Deb, Bangalore, April 19, 2019.

13 A. Mahesh, Integrated urban planning in Bangalore and BBMP restructuring,interview with A. Deb, Bangalore, April 24, 2019.

14 R. Ashok, Integrated urban planning in Bangalore and STAMP project, interview with A. Deb, Bangalore, April 16, 2019.

15 R. Ashok, Number of planners in BBMP, interview with A. Deb, Bangalore, July 8, 2019.

16 A. Nair, BBMP restructuring reports and municipal finance, interview with A. Deb, Bangalore, April 22, 2019.

TABLE 1. URBAN INNOVATIONS

INNOVATION CHRONOLOGY	DESCRIPTION
1800s	**Market and fort** The market (*petta*) and fort are the oldest areas of Bangalore that still form a secure human settlement.
1860s	**Military Station or Cantonment** Established during British rule, the cantonment was developed for military purposes. Neighborhoods within the cantonment were equipped with public spaces, electricity, drainage, water supply and sanitation.
1890s	**Planned neighborhoods** Two neighborhoods (Malleswaram and Basavangudi) were planned as "model hygienic suburbs" to avert the risk of epidemic outbreaks.
1950s–1960s	**Public Sector Undertakings** Designated as public sector undertakings, several central- government-owned industries were set up in Bangalore. They mainly catered to the defense sector.
1980s–1990s	**Special Economic Zones for Technology Parks** Following the introduction of neoliberalist policies in India, two early information technology (IT) parks —Electronic City and Whitefield—were set up in Bangalore to encourage private-sector investment in Bangalore's economy.
1999–2004	**Bangalore Agenda Task Force** This task force was formed in 1999 by the Chief Minister of Karnataka to bring civic leaders and public agencies together to make decisions for the city.
1993 and 1999	**Citizen Report Cards** The Public Affairs Centre, a Bangalore-based nongovernmental organization, introduced a score card to assess the performance of public agencies through user reviews.
2002	**Outer Ring Road** A high-speed outer ring road for buses, goods-carrying vehicles, and personal vehicles was completed.
2005	**Karnataka Water and Sanitation Pooled Fund Trust** This trust is a special purpose entity to pool finance for eight urban local bodies. Tax-free municipal bonds contributed 15 percent—100 crores—of the Greater Bangalore Water and Sanitation Project (GBWASP) budget.
2006–2012	**Karnataka Municipal Reform Project** This was a World Bank–financed statewide project to improve municipal services.
2007	**BMP to BBMP expansion** The expansion of the municipal boundary of Bangalore to include 7 city municipal councils, 1 town municipal council, and 111 villages around it, now called the Greater Bangalore Authority or Bruhat Bangalore Mahanagara Palike (BBMP).
2007–2015	**Greater Bangalore Water and Sanitation Project** Project to extend water supply and sanitation services to eight local urban bodies around Bangalore.
2009	**Big10 bus routes** Identification of express bus transit corridors between major activity centers in the metropolitan area such as the IT job centers of Electronic City and Whitefield. The bus routes run radially to include nodes in all directions of the city.
2009	**Peripheral Ring Road** High-speed corridor for buses, goods-carrying vehicles, and run on text rather than breaking after 'person'.
2009–ongoing expansion	**Tender SURE roads** Civil society prepared a set of guidelines called Tender SURE that enabled the government to implement better road designs. Better-planned street sections have encouraged pedestrian movement in the city through wider footpaths and reduced traffic congestion.
2011–ongoing expansion	**Metro Rail** The Metro Rail mass transit system operates from the north, south, east, and, west of Bangalore.
2014–2017	**BBMP Restructuring Committee** A restructuring committee set up by the chief minister authored a set of reports offering recommendations for more efficient administration and governance of the metropolitan area.
2017–ongoing	**Implementing the BBMP restructuring recommendations** Several recommendations by the BBMP Restructuring Committee are now being implemented. The state government is actively pursuing two others: creating a standard GIS database for Bangalore's Spatial Information Center and passing the Greater Bangalore Governance Bill.

Source: World Bank with a team of WRI India experts, 2019.

within the metropolitan area, was implemented through BWSSB, which was authorized by statute to cover all eight urban local bodies. In another instance, Tender SURE was initially proposed by a civil society alliance. These are a set of specifications that act as guidance for road construction—or upgrading—in a complete streets approach. Tender SURE is now a rapidly scaling program funded and implemented by the state of Karnataka, after its approval by a state technical advisory committee.

Horizontal integration across social, economic, and environmental sectors does not happen at the same time but rather through a series of decisions often taken discontinuously over time. Since the 1800s, Bangalore has responded to crises such as epidemics, job scarcity, population explosion, housing deficit, increasing traffic congestion, and degrading natural ecosystems. These crises have been followed by responsive interventions in housing, commerce, transport, water supply, and sanitation (Table 1). But in responding, the 10-year wait for masterplanning was not always practical. Given the imminent nature of problems, special-purpose vehicles or entities were often established. The Bangalore Metro Rail Corporation Limited and Karnataka Water and Sanitation Pooled Fund Trust (KWSPFT) are two prominent examples of institutions set up outside the masterplanning process to deliver mass transit and water supply and sanitation solutions, respectively. Table 1 shows the chronology of innovative interventions from the 1800s, through attempts are servicing the metropolitan area with water, sewerage, and transportation, to the present when the government is considering recommendations from a committee that was set up by the chief minister to study these efforts and draw lessons for more efficient administration and governance of the metropolitan area. Figure 1 maps these projects showing the cumulative effects in the metropolitan area.

Horizontal integration across social, economic, and environmental sectors does not happen at the same time but rather through a series of decisions often taken discontinuously over time.

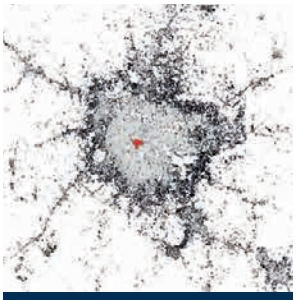
PROCESSES, ACTORS, FINANCING, AND IMPLEMENTATION MECHANISMS

Both public and private initiatives have enabled integrated planning in Bangalore. The key processes have included drafting a city development plan coordinating various sectors, formally integrating the water and sanitation sectors under one agency, expanding the municipal boundary, setting up special purpose vehicles (or entities) and ad hoc committees, building and using coalitions, engaging in public advocacy with the government, increasing public participation, obtaining international financing conditionality, and assigning institutional accountability within the public sector.

The implementation of programs included a multi-stakeholder ecosystem of actors, including donors, guarantors, and institutions providing technical support. National actors include the Government of India and its finance commission. Provincial institutions (state agencies) have included the Bangalore

Figure 4 Strategic projects in Bangalore, 1800–2011

Source: Amartya Deb, based on data from the German Aerospace Center, DLR; Google Maps; Open Street Maps, Bangalore Metro Rail Corporation Limited, and BMTC.

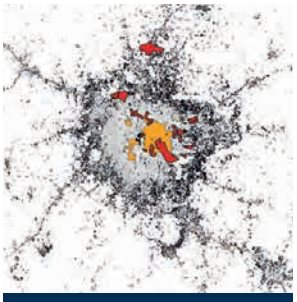


1800s
Petta and fort

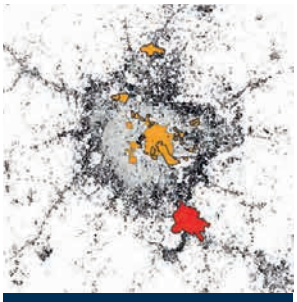
1860s
Military station

1890s
Planned neighborhoods

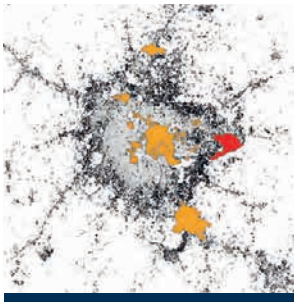
1950s
First PSU (ITI colony)



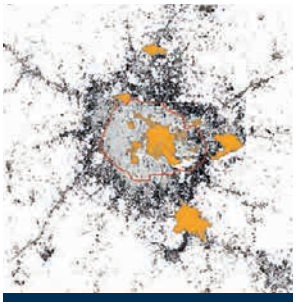
1960s
PSU bloom phase



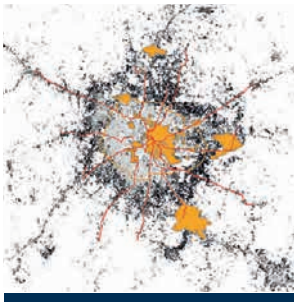
1980s
Electronic city (1978)



1990s
Whitefield



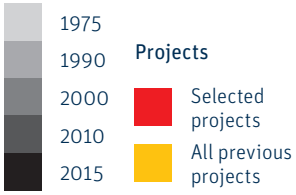
2002
Outer ring road



2009
Big 10 bus routes (BRT)

2011
Metro rail

Note:
Bangalore urban growth epochs



Water Supply and Sewerage Board, Bangalore Electric Supply, and the Karnataka Urban Infrastructure & Development Finance Corporation. At the city level, BBMP and other urban local bodies, nongovernmental bodies, private firms, and citizen groups are important actors.

Civil society organizations and corporations play an important role in decision making within Bangalore, and they have a particularly strong history. The Bangalore Agenda Task Force, set up in the 1990s, includes corporate leaders who helped turn Bangalore into an IT hub. Nair (2005) documents how this task force managed to get commitments from all the public agencies on a common vision. The Public Affairs Centre, a nonprofit, established, citizen report cards, a user feedback mechanism to hold public services accountable. More recently, civil society has shifted from an advisory role to consultation and advocacy. The Tender SURE guidelines, for example, were prepared by civil society organizations before being adopted by the BBMP and the state of Karnataka.

The local public sector has promoted integrated planning through expanding municipal administrative boundaries to include peripheral areas. The expansion from Bangalore Mahanagara Palike (BMP) to Bruhat Bangalore Mahanagara Palike (BBMP) was crucial to increase revenue collection, and it also enabled coordination among agencies for operations and management at the metropolitan level. One senior official at the water supply and sewerage board pointed out a similar integration of zones for delivery of water supply and sanitation services, which occurred through a government order in 1994, to simplify the redressing of complaints.[17] This arrangement later made it possible to implement integrated plans for water and sanitation through initiatives like the Greater Bangalore Water and Sanitation Project (GBWASP) in 2004 and a state trust fund formed in 2005 to help eight local urban bodies finance water and sewer extensions.

TOOLS FOR INTEGRATED PLANNING

Bangalore's service delivery is largely financed by grants from the public sector and international donors. The GBWASP project is financed by the public sector as well as the World Bank. Tender SURE roads are being built all over Bangalore through direct grants from the state government. Mechanisms such as pooled financing and intergovernmental transfers have encouraged horizontal integration through cross-sectoral and interjurisdictional planning along with intergovernmental coordination. The Karnataka Water and Sanitation Pooled Fund Trust (KWSPFT) was created to jointly finance eight urban local bodies within Bangalore's metropolitan area. The fund, which also accepts central

[17] P. Kumar, Assistant Controller Finance, BWSSB, interview with A. Deb, Bangalore, August 7, 2019.

The City Railway Station, with links to two metro lines and buses offering connectivity across Bangalore, acts as a focal point for the wider metropolitan region.

Source: Amith Nag Photography/ Moment via Getty Images.

and state government funding, enables the urban local bodies to access market finance without a state guarantee.

Four types of planning and financial tools enabled integrated planning in Bangalore. They include legal tools, agreements and guidelines, financial tools, and rule-setting for financial transfers.

- *Legal tools* include masterplans and government orders.
- *Agreements and guidelines* include memoranda of understanding (MoUs), special committee reports, and technical guidelines (such as construction guidelines), which are influential due to their high-level political endorsement and bureaucratic involvement.
- *Financial tools*: grants, loans, and pooled financing, as well as efforts to sell bonds to private investors and user fees for service.
- *Rules that set conditions for financial transfers* include revolving funds like the Mega City Scheme[18] for slums.

Implementation and Financing

TWO PROJECTS ARE EXAMPLES of successful cross-sectoral and interjurisdictional integration between government agencies in the Bangalore metropolitan area. One was led by the metropolitan public water authority and the other initiated by private sector to address urban design and walkability. The first program integrated the water and sanitation sector in response to a fragmentation of service delivery in the urban periphery. The second required various service providers to collaborate in setting up utilities like streetlights, drainage, and water piping along with roads and footpaths to build better road infrastructure. The dynamics involved in implementing policies and projects are discussed through these two examples, which represent a microcosm of the rapidly growing city's integration challenges. This section will analyze the actors involved, the institutional architecture, the sustainability issues, and private participation in these two projects separately along with an analysis of risk management.

GREATER BANGALORE WATER AND SANITATION PROJECT

Use of a pooled financing model furthered sectoral integration in a major water and sanitation project across administrative jurisdictions. Although the

[18] The Mega City Scheme was a central government initiative launched in 1995 for seven cities, of which Bangalore was one. kuidfc.com/ENG/project_megacity.htm.

Bangalore Water Supply and Sewerage Board (BWSSB) was already responsible for delivering water and sanitation under one umbrella, extending water and sanitation facilities from the core city to its periphery required coordination among eight urban local bodies.

This $14 million project was needed to service a huge area of recently settled areas in the expanded greater Bangalore region. Figure 3 shows the area of expansion.

Interjurisdictional collaboration helped the urban local bodies access market finance—without a state guarantee—for the first time. National institutions have traditionally obtained financing for urban infrastructure development by borrowing from global funding agencies. Growing pressure on the national government has led state governments to also seek such funding. In this case, eight urban local bodies sought market financing through the node of a state trust fund. These urban local bodies were incorporated as central players into the ecosystem of actors that ranged from the international level including World Bank and the U.S. Agency for International Development (USAID), state bodies such as the development and finance corporation and a specially created trust fund, to the BWSSB. The pooled financing model for Bangalore was adopted by Karnataka from Tamil Nadu.

Use of a pooled financing model furthered sectoral integration in a major water and sanitation project across administrative jurisdictions.

In 2005, urban local bodies on Bangalore's metropolitan periphery assumed risks for raising finance for a water supply and sanitation project. Donor agencies such as Indo-USAID and the World Bank provided technical assistance to BWSSB, which was primarily responsible for implementing the project. While neither the Government of India nor the state of Karnataka had a direct role, their policy reforms helped access market finance (Box 1).

BOX 1. HOW EIGHT LOCAL URBAN BODIES IMPROVED THEIR CREDITWORTHINESS TO FLOAT BONDS

To access resources without a state-government guarantee, the urban local bodies together floated tax-free municipal bonds. Their pooled financing allowed them to access market finance to tackle this large-scale project while avoiding costs such as individual documentation and marketing and helping to spread risk among the stakeholders (Government of Karnataka 2016; World Bank 2016).

But to issue tax-free bonds, the bodies needed a single node, created by the state for this purpose, called the Karnataka Water and Sanitation Pooled Fund Trust, which was backed up by a credit guarantee from the U.S. Agency for International Development (USAID). The Karnataka Urban Infrastructure & Development Finance Corporation (KUIDFC) served as the

nodal agency between the borrowers (urban local bodies) and investors (bond holders).

The local urban bodies needed to prove creditworthiness to attract private investment in their bonds. They needed to prove to investors that they would be able to manage and repay the loans.

In addition to an escrow account for financial risk mitigation, each of the eight urban local bodies maintained a ring-fenced water project account.[a] This account received payments from both urban local bodies and the state government toward debt servicing. KUIDFC acted as the fund manager for the KWSPFT bonds.[b] Because the municipal bonds would benefit from being tax-free, KWSPFT coordinated directly with the central government's income tax department[c] Revenue and capital transactions for the GBWASP project were reportedly maintained by BWSSB, under prevailing standards for accounting systems set at the time by the Institute of Chartered Accountants, India.[d]

Factors that played a role in obtaining bon financing were:

- Commitment under the bond requirements for repayment, enhanced by a credit guarantee from USAID of 50 percent
- Setting up a monitored and structured payment mechanism between the urban local bodies and bondholders through an escrow account with 25 percent of borrowed capital
- Improvement in the credit quality of the urban local bodies, due to Karnataka's tax revenue growth[e] and a reduction of state government expenditure
- Upgrading in bonds' credit ratings, reflecting the reduction of financing risks for investors due to the increase in the share of fiscal transfers from central government to state government through the Fourteenth Finance Commission.[f]

[a] The urban local bodies (represented by BWSSB) transferred payments from revenue sources like taxes and tariffs, and the state government offered annual operating grants for debt servicing.

[b] The pooled fund trust had several requirements beyond financial reporting. The BWSSB, as the implementing agency, would have to carry out tasks based on the Karnataka government's directions. BWSSB was to distribute water to the eight councils equitably. The project could cater to industrial demands, but feeder lines were to be laid at BWSSB's own costs. To lay underground drains and build the water supply infrastructure, roads had to be dug up, and the cost of restoration was borne by respective urban local bodies. Normal operations and management costs of the project, however, were part of the project fund. While a project management unit and several committees were set up by BWSSB, the implementing agency had the liberty to hire two engineers for the implementation of the GBWASP project (KWSPFT 2019, p. 23).

[c] K. Ramesh, General Manager Finance, KUIDFC, interview with A. Deb, Bangalore, August 20, 2019.

[d] K. Ramesh, General Manager Finance, KUIDFC, interview with A. Deb, Bangalore, August 20, 2019.

[e] Compound annual growth rate of 13 percent during 2012–16.

[f] The Fourteenth Finance Commission was a central government commission established in 2013 that released recommendations in 2015. www.thehindu.com/business/recommendations-of-the-14th-finance-commission/article6929255.ece.

The agencies involved either had pre-existing mandates, were ordered to cooperate, or were created to carry out the task. The key implementing agency, BWSSB, had a mandate to service much of the city of Bangalore and the eight urban local bodies.[19] A government order required the eight urban local bodies to come together to pool financing through bonds. Thereafter, the urban local bodies signed an MoU with BWSSB to implement the GBWASP project.

Karnata's 2002 state water policy encouraged the private sector to participate in "planning, investigation, design, construction, development and management of water resources project" (Government of Karnataka 2002). The state government felt that introducing private corporate management would enhance project efficiency. Bangalore's urban local bodies expanded the policy to include the private finance sector, jointly floating bonds to finance the GBWASP (See Figure 3).

Pooled financing was effective in overcoming the limited autonomy that Bangalore's urban local bodies faced in funding infrastructure. The 74th Constitutional Amendment Act, 1992 had failed to adequately involve urban local bodies in sharing risks with the state government, thus weakening their ability to access market finance individually (Garg 2007).

Pooled financing was effective in overcoming the limited autonomy that Bangalore's urban local bodies faced in funding infrastructure.

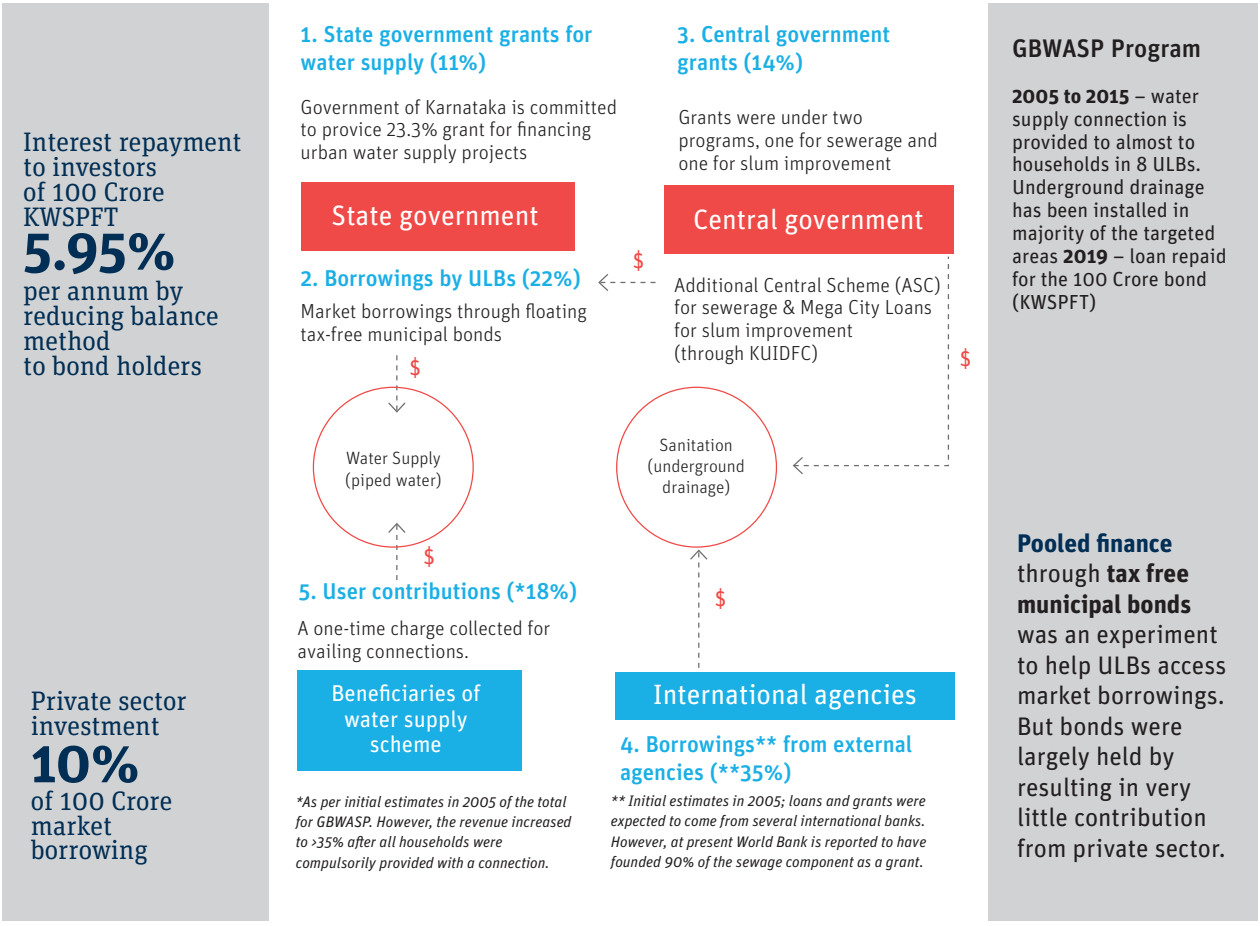
In the end, the project saw little participation from conventional private investors: four out of the five banks investing in the bonds were public institutions. The reluctance of the private sector to invest in these bonds was credited to water being the commodity in question. Officials at KUIDFC hold that commercialization of core public goods such as water is not feasible, since the municipality is obliged to offer these goods at subsidized rates. Market financing for goods that the poor depend on for basic needs is not deemed to be feasible, given the political pressure on retaining affordable rates of service delivery.

In addition to seeking finance through bonds, the urban local bodies charged a one-time user connection fee to the beneficiaries. At the start of the project, the rate was about $124 (INR 8,500) for domestic users and $248 (INR 17,000)) for commercial or industrial users. Planners estimated that if 50 percent of the household and businesses in the area paid for connections, it would bring in $17.4 million (INR 119.4 crores).

GBWASP had previously faced criticism in terms of accountability and efficiency in delivering services (Ranganathan, Kamath, and Baindur 2009). Citizens complained about the having to make upfront payment and to pay penalties for late payments. As a result, the BWSSB revised rates, introduced installments, and waived penalties. After these measures, the model was better received (Ranganathan, Kamath, and Baindur 2009). The government mandated that all users connect to the new system, but it is not clear whether that happened.

[19] All eight urban local bodies—Bommanahalli, Byatarayanapura, Dasarahalli, Krishnarajapuram, Mahadevapura, Rajarajeshwarinagar, Yelahanka, and Kengeri—became part of Bangalore Metropolitan area after the expansion of BMC to BBMP in 2007.

Figure 5 Financial flows—how a multistakeholder ecosystem funded water supply and sanitation



Source: Amartya Deb, based on data from KWSPFT, BWSSB, and KUIDFC.

Note: 100 crores =US$13.9 million.

A senior KUIDFC expert pointed out that ''estimations in early stages'' were made but it was later learned that user fees were, in reality, far higher than expected, as high as 70 percent of the project cost.[20] In comparison, total borrowings, including the market funding of $ 14.6 million (100 crores) in bonds and state loans of $4.4 million (30 crores) did not exceed $21.9 million (150 crores) K. M. Ramesh, general manager of finance for the KUIDFC in charge of the KWSPFT portfolio, made this point:

> ''The KWSPFT was an experiment for financing future projects, and the minute we said water will be given, beneficiaries' (urban local bodies') contribution was much more because they were assured of the water supply. Of course, there were initial hiccups. But since the project covers basic needs of citizens, they were willing to pay – provided agencies implemented them seriously and efficiently.''[21]

[20] K. Ramesh, General Manager Finance, KUIDFC, interview with A. Deb, Bangalore, August 20, 2019.

[21] K. Ramesh, General Manager Finance, KUIDFC, interview with A. Deb, Bangalore, August 20, 2019.

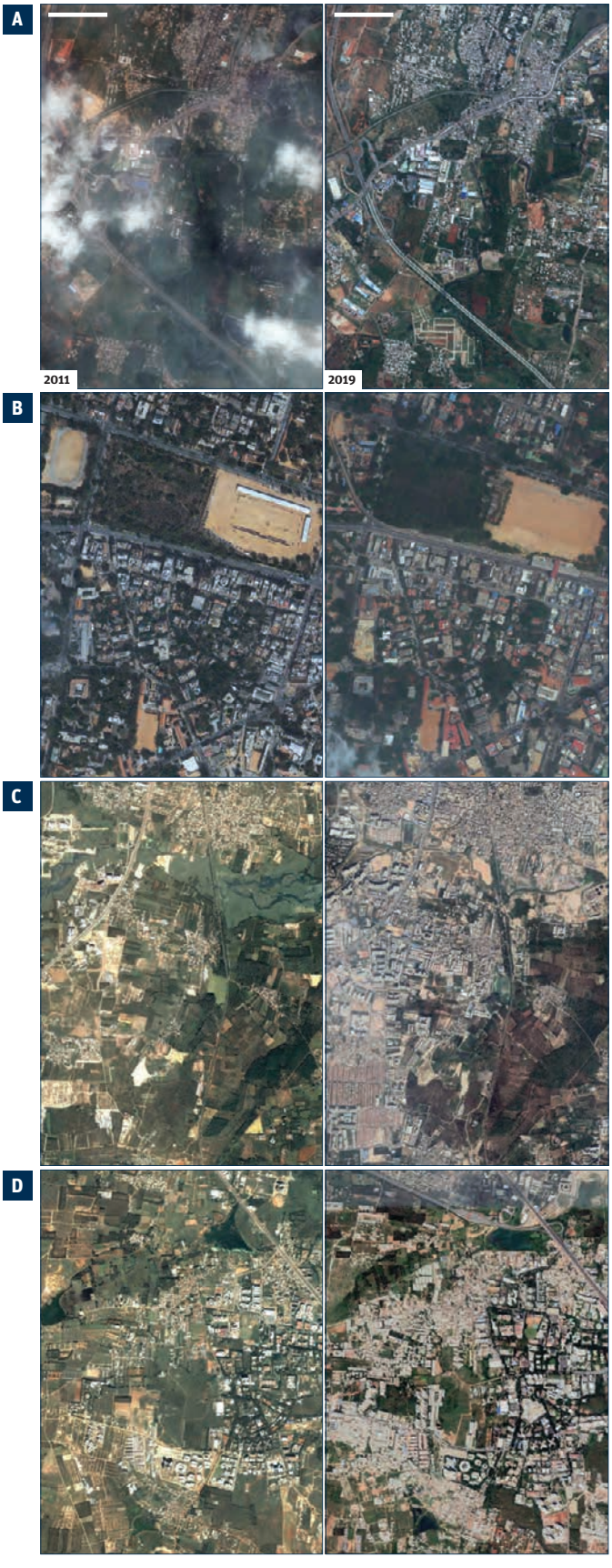


Figure 6
Then and now,
2015, 2019

A. LAND PRESSURE ON THE OUTSKIRTS

Although a relatively low-density area at the periphery of Bangalore, Kengeri is one of the 8 urban local bodies (ULBs) where the KWS pool fund project was targeted. Before and after images between 2004 and 2019 should show the increase in built-up area – signaling the pressure on urban growth over time and increasing demand for service delivery at the peripheral areas of Bangalore metropolitan area. In 2019, one can also find a segment of outer ring road in Bangalore and the effects of urbanization that has occurred, suggestively due to water, sewerage and transit infrastructure.

B. NEW METRO BUILT IN THE HEART OF THE CITY

This is a high density area at the heart of Bangalore city. Between 2005 and 2019 one can find a metro station to come up in this area as well as development of Tender SURE roads. The Tender SURE roads can be thought of as upgradation of existing roads as opposed to new emerging roads. This location could also be chosen for a before-after depiction; since in 2005 there was neither the metro station, nor the Tender SURE roads.

C. URBAN DEVELOPMENT IN THE RIVER BED

D. URBAN SPRAWL AROUND INFOSYS CAMPUS

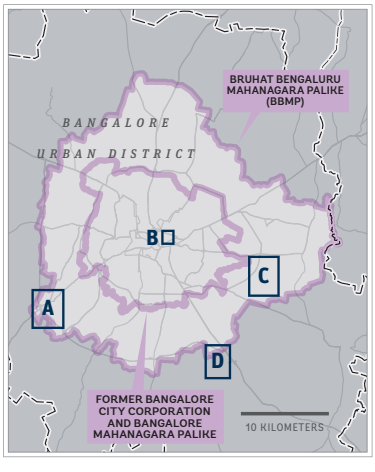
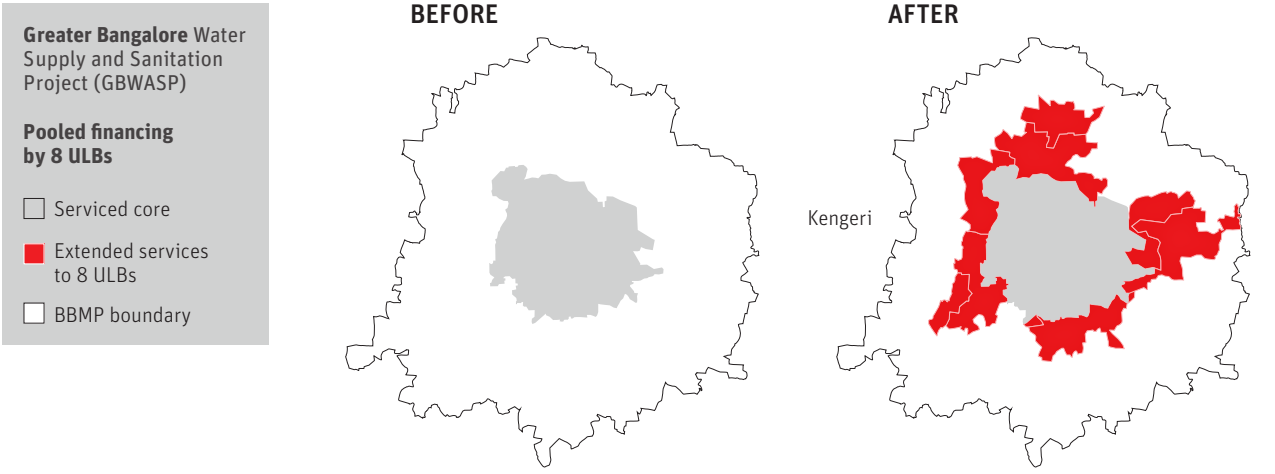


Figure 7 Greater Bangalore water supply and sanitation project: Serviced area, before and after



Integrating peripheral areas by extending services of piped water supply and underground drainage. 8 ULBs in Bangalore raised INR 100 Crores (USD 13. 9 million) through tax-free municipal bonds to fund GBWASP; along with central and state government grants, beneficiary contribution and government loans.

Source: Amartya Deb, based on BWSSB and KUIDFC data.

Experts at KUIDFC hold that while residents initially tend to resist user fees because they are often misled with "false propaganda" about privatization and higher tariffs, they are reported to have been more willing to pay for receiving better services.[22]

Figure 7 shows how a multi-stakeholder ecosystem funded the water and sewerage extension to Bangalore's outer urban bodies. The total cost was calculated to be $14 million with 18 percent supplied by one-time user connection fees, 35 percent from international funds (mainly the World Bank), 22 percent from the urban local bodies' municipal bonds, 14 percent from grants from the central government, and 11 percent from state grants. In fact, the user connection fees funded 35 percent of the project. The state provided 11 percent – about half of its target. Private finance was only 10 percent of the tax-free municipal bonds, which provided 22 percent of project finance.

TENDER SURE

Road construction is typically a complex affair that involves excavation, installing water, sewerage, and electric lines, urban forestry work, and finally street infrastructure, with each carried out by a different public agency. The lack of coordination among these agencies has led to newly tarred roads being dug up for installing underground infrastructure; which leads to a waste of time and funds.

Tender SURE (Specifications for Urban Utilities & Road Execution) brought public agencies together to collaborate on how to build or rebuild roads that are safe and cater to a variety of transport modes including, mass transit, autos, informal transit, cycling, and walking (Box 2).

[22] K. Ramesh, General Manager Finance, KUIDFC, interview with A. Deb, Bangalore, August 20, 2019.

BOX 2. WHAT IS TENDER SURE?

Tender SURE is a multi-crore project aiming to upgrade roads in the Central Business District to international standards. According to Jana Urban Space Foundation (JUSP) that is spearheading the project, Tender SURE (Specifications for Urban Road Extension) road standards mandate the integration of networked services under the road – water, sewage, power, optical fiber cables, gas, and storm water drains.

The design of Tender SURE roads prioritizes the comfort and safety of pedestrians and cyclists, and recognizes the needs of street vendors and hawkers. Tender SURE combines street landscape and hardscape aesthetics with practical considerations of user behavioral change.

All civic agencies are involved in project discussions from the planning stage and their role in the planning, execution and maintenance is finished.

Focus points of Tender SURE are:

- De-incentivize use of private transport
- Uniform lane width
- Pedestrian-friendly footpaths
- Utility ducts on both sides of the roads
- Cycle lanes wherever feasible

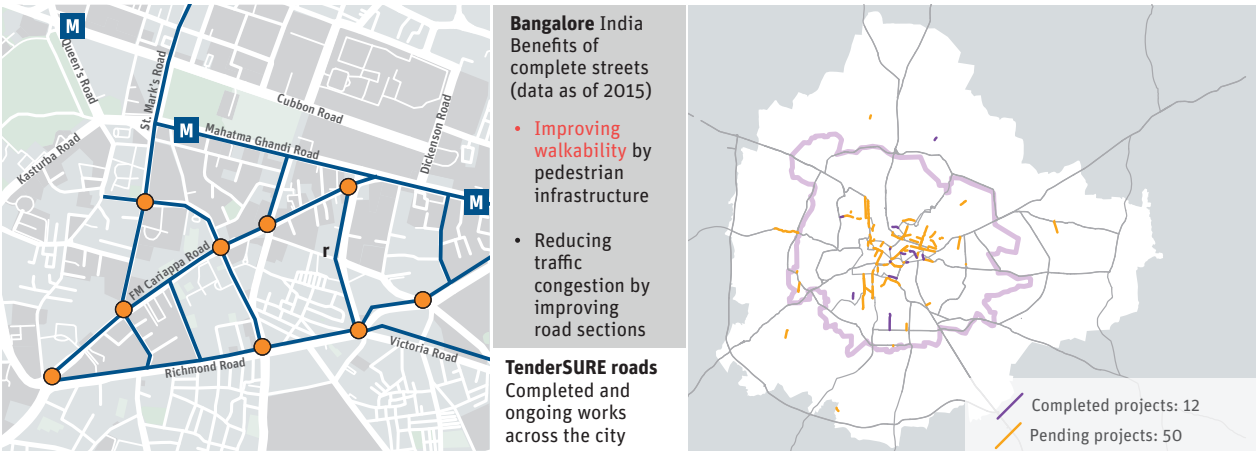
Tender SURE roads are pilot or model roads that are planned to last longer than the current conventional lowest-bid contractor-laid roads, that not only need constant maintenance and repair but also keep getting dug up by other service providers. In Tender SURE, the monitoring system in place is supposed to be strict and is expected to ensure that standards are adhered to and the traditional commission system is completely removed from the picture.

Source: Josephine Joseph, 2015. "What's this Tender SURE all about?" Citizen Matters. March 16, https://bengaluru.citizenmatters.in/all-about-tendersure-bangalore-7206

The Tender SURE initiative originated outside government with several civil society organizations who came up with a plan that was later funded by the state and implemented by the city. The project highlighted how to make the already-serviced core area more efficient by addressing critical missing connections between networked infrastructure and city's physical form. Sadoway and Gopakumar (2017) refer to this as "assemblage urbanism" and point out how implementation requires that civil society be engaged with a range of government and nongovernment actors to form political networks.

The Bangalore City Connect Foundation completed a pilot on one road in 2009, and then worked with the nonprofit Jana Urban Space Foundation to complete a

Figure 8 Scale up with TenderSURE



Mass transit is integrated with social and economic opportunities as street design and walkability are improved.

Sources: TenderSURE project report by Jana Urban Space; BBMP data.

manual in 2012, which served as the technical guidelines and basis for a state government budget allocation in 2012. After that, Tender SURE projects were implemented by the BBMP with grants from the state government (B.R. 2014).

TenderSURE actors

The project is an unusual interagency[23] effort in Bangalore that addressed the need to reconfigure electric, water, and sewerage lines for road construction (B.R. 2014). Additional actors included political leaders, public officials, and civil society organizations.[24] For the first phase, Tender SURE received grants from the state government with BBMP as the nodal agency to manage funds and coordinate the agencies involved in implementation.

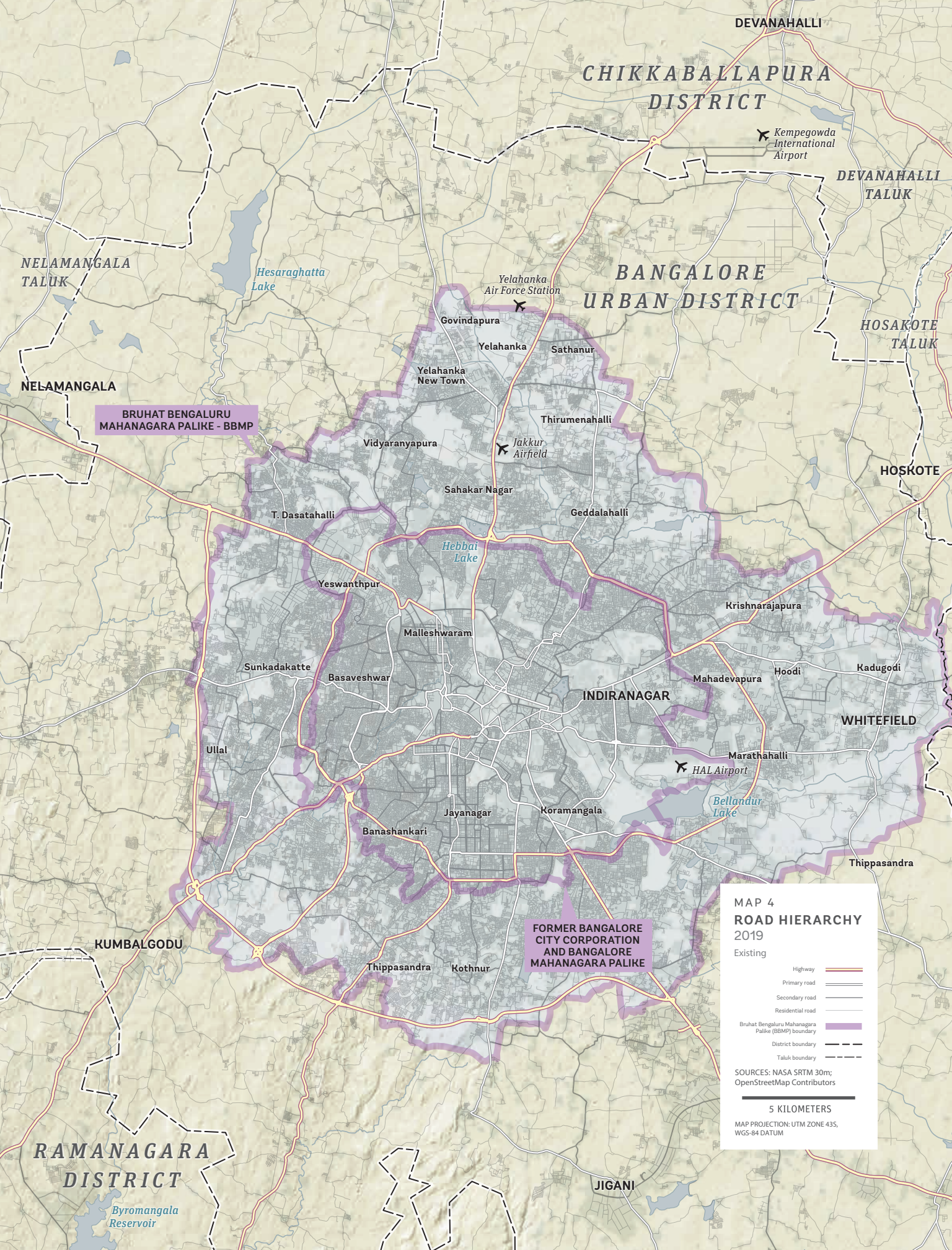
A bottom-up perspective

Taking a bottom-up perspective on planning, Dhindaw, Ganesan, and Pai (2017) explains how coalitions of institutions in Indian cities outside of the formal public institutional architecture have led to transformative change. The Tender SURE project demonstrates that a bottom-up approach within the system can influence integrated planning in a positive manner and push government actors toward integration. The Tender SURE project demonstrates the potential for new ways of working across sectors for improved service delivery. This project is a good example of how private and civil sector participation in Bangalore has been key to delivering non-networked infrastructure, even without a formal public-private partnership.

The process of preparing and advocating Tender SURE guidelines to upgrade roads was entirely carried out by nongovernmental organizations and private firms without

[23] BESCOM, BWSSB, and BBMP are the related agencies.

[24] S. Ramanathan. Integrated urban planning in Bangalore and tender SURE project, interview with A. Deb, Bangalore, April 22, 2019.



MAP 4

ROAD HIERARCHY

2019

Existing

- Highway
- Primary road
- Secondary road
- Residential road
- Bruhat Bengaluru Mahanagara Palike (BBMP) boundary
- District boundary
- Taluk boundary

SOURCES: NASA SRTM 30m; OpenStreetMap Contributors

5 KILOMETERS

MAP PROJECTION: UTM ZONE 43S, WGS-84 DATUM

any formal commitment from the public sector at the early stages – thus marking an important turning point for governance in the city. However, once the government was convinced, Jana Urban Space Foundation, one of the key private agencies in advocacy, entered into a design and technical partnership with the city and state governments for project delivery (Bangalore City Connect Foundation 2012).

The sustainability and scaling of the project now rests with the government, which is upgrading 55 roads, of which 12 have been completed across the metropolitan area. Land ownership and authority for road construction, upgrading, and maintenance are vested with the government (Figure 4).

Despite being a landmark of integrated urban planning in Bangalore, Tender SURE has been critiqued for its high cost and lack of flexibility in design (Bharadwaj and Ramani 2014). Some are skeptical about privatization in the construction of roads, while others note the missed opportunity for enhancing the city's tree cover and groundwater recharge from rainwater runoff because of the hard surfaces and lack of trees in Tender SURE design (Sheshadri and Pai 2016).

RISK MANAGEMENT

Projects faced four types of risk: that of delay and disappointment, financial risk, construction risk, and risk of sustaining the project over time.

Risk of delay and disappointment

Delay in financial flows between the funding and implementing agencies can hinder projects, pushing their timelines further out, and incurring extra costs. In the case of KWSPFT bonds, this risk was mitigated by a government order that the state of Karnataka must allot sufficient funds in the budget so that the KWSPFT term loans could be paid to the respective agencies in a timely manner. Another common hindrance to timely delivery stems from the need to obtain approvals from multiple government agencies to access market finance. A lesson from Tamil Nadu's water and sanitation project, a precursor to Bangalore's project, was to include more explanation in documents and clarify the credit enhancing mechanisms involved (World Bank 2016).

Financial risk

Inadequately planned finances put projects at risk during implementation. However, detailed project reports can identify such risks ahead of time. For the water and sanitation program, reports by two private firms revealed that the original project proposals developed by the public sector would not be financially feasible (KWSPFT 2019). This helped the government of Karnataka decide to adopt the alternative financing mechanism of pooled financing to mitigate risks. Although accessing private finance for infrastructure can add a new source of funds, the credit rating and credibility of urban local bodies must be solid. Setting up an

escrow account for KWSPFT and using bank guarantees helped improve the credit ratings of the pooled fund by mitigating financial risks (see Box 1).

Construction risk

Availability of land is a common problem for implementing projects (Kappan 2019). For example, land is needed to construct pumping stations for water supply and sanitation projects. In addition to lack of land for laying infrastructure, the GBWASP faced the challenge of natural features that posed barriers to constructing a sewerage network. These hurdles, in addition to an incomplete design of the sewerage system, led to dysfunctional infrastructure. As a result, sewage has been let out into drains instead of being properly treated. The BWSSB has deployed technical teams to identify and resolve the "missing links."[25]

Sustainability risk

Lack of resources (or revenue) affects a project's operation and maintenance over time. In the case of the bonds raised for GBWASP, the urban local bodies benefitted through increased intergovernmental transfers (ICRA 2016). Political changes can stall projects or deprioritize them, in effect harming their operation, augmentation, management or maintenance. Making Tender SURE's implementation was the state government's responsibility has helped minimize this risk, although it remains to be seen if the roads will be properly maintained as the years pass.

Global and Local Environmental Outcomes

BANGALORE HAS INCREASED global environment benefits through strategic infrastructure projects.

CHANGES IN TRANSIT PATTERNS REDUCES AIR POLLUTION AND GREENHOUSE GAS EMISSIONS

Encouraging walkability and reducing congestion within the city core through complete streets can reduce emissions from fossil fuels, stimulate local economies, and help densify the city core. A denser city core is a counterweight to urban sprawl, which is known to encroach into natural landscapes around a city and create automobile-dependent communities that add to carbon emissions (Sudhakaran et al. 2017).

A denser city core is a counterweight to urban sprawl, which is known to encroach into natural landscapes around a city and create automobile-dependent communities that add to carbon emissions.

[25] T. Girinath, interview with A. Deb, Bangalore, August 6, 2019.

A well-designed road infrastructure helps reduce carbon emissions by encouraging walkability as well as shorter travel time.

The community-initiated Tender SURE project has helped encourage accessibility to mass transit and reduce traffic congestion through well-designed streets.[26] A well-designed road infrastructure helps reduce carbon emissions by encouraging walkability as well as shorter travel time (B.R. 2014). However, after implementation of 12 projects under Tender SURE, some local urbanists argue that the lack of consideration for trees and swales in Tender SURE roads will hinder groundwater recharge and discourage biodiversity, which depends on tree cover. More trees would help improve pedestrian comfort by providing shade to counter urban heat island effects and in turn mitigate emission of greenhouse gases (Sheshadri and Pai 2016). Applying this suggestion could enhance the global environmental benefits in the 50 upcoming Tender SURE projects.

For infrastructure projects, mitigation of adverse impacts on the global and local environment should be part of the project design, construction, and operation. While infrastructure provides residents with services and a better quality of life, its construction, if not properly planned, can degrade habitats and generate more carbon emissions through transportation and fossil-fuel based machinery contributing to the acid rain that destroys local natural and cultural resources level and accelerating global climate change (Independent Evaluation Group 2007). By integrating the sewerage and water-supply sectors, the city aims to reduce waste discharge into the surface water bodies in its jurisdiction.

WATER AND SEWERAGE IMPROVEMENTS REDUCE POLLUTION AND IMPROVE HEALTH

Piped water supply has helped reduce groundwater exploitation and mitigated the risks of groundwater contamination. Maintaining a higher water table has been beneficial for flora and fauna in the region, and reducing water pollution has provided direct health benefits and improved livability for Bangalore's metropolitan population. The Bangalore water supply and sanitation project (BWSSP) was designed to avoid severe impacts on topography, surface water, soil quality, and cultural resources (Infrastructure and Energy Sector Unit 2006). However, moderate impacts—such as a lowering of the ground water table due

[26] Community involvement in the form of consultations and stakeholder participation in infrastructure projects can enhance delivery of global environmental benefits and offer local benefits at the same time (Global Environment Facility Evaluation Office 2006).

to excavation, pollution from suspended particulate matter in the air, and noise due to transportation and the operation of equipment—were unavoidable (Infrastructure and Energy Sector Unit 2006). Careful planning and assessments of GBWASP largely limited these impacts so they were temporary, confined to the construction phase.

Conclusion

BANGALORE'S RAPID GROWTH over the past two decades has presented formidable challenges for urban planning because its planning systems have not been in sync with economic growth and physical expansion. Encumbered by lengthy and time-consuming processes with undefined goals and budgets, along with a lack of capacity and authority, urban local bodies struggle to meet the ever-rising developmental demands that growth placed upon them. Additionally, a multiplicity of organizations and overlapping responsibilities has often resulted in disjointed planning.

Integrated urban planning in Bangalore is thus defined as not only the combination of sectors such as transport, water, sanitation, and others related to service delivery; but also the coordination among different administrative agencies that work toward planning and implementing projects for the sustainable development of the urban agglomeration. The case of Bangalore illustrates the notion that at the metropolitan scale, integrated planning happens through both long-term decision-making processes and interim or midcourse interventions. In addition to the city's masterplan, which is prepared every 10 years, interim strategic projects are planned and executed in between. The latter are often not a part of the masterplan but have required or led to coordinated efforts among different stakeholders. The GBWASP and Tender SURE projects highlighted in this study are two such initiatives that were not part of the masterplan.

Given the broad-brush planning approach of the masterplan, which often fails to harmonize with local ground realities, those two projects make the case for complementing the masterplan with other plans, projects, and policies that are strategic in nature, with terms that are immediate or at least variable (from the

The case of Bangalore illustrates the notion that at the metropolitan scale, integrated planning happens through both long-term decision-making processes and interim or midcourse interventions.

masterplan) and the implementation of which may start locally. Often, instances of integrated planning in Bangalore have been seeded locally as proof of concept—and Tender SURE is one such example.

STRENGTHS OF THE MULTI-STAKEHOLDER MODEL

Engagement with a larger stakeholder community has helped move policy changes. Furthermore, arranging a multi-stakeholder ecosystem model for integrated planning has both made projects cost-effective and better mitigated risks and conflicts in service delivery. The multi-stakeholder model has included citizens as well as private and public actors across sectors and administrative jurisdictions. For instance, urban local bodies in Bangalore accessed funds for GBWASP through a combination of grants, revenues and innovative market finance, thus involving commitments from various actors in both public and private sectors.

Often, instances of integrated planning in Bangalore have been seeded locally as proof of concept—and Tender SURE is one such example.

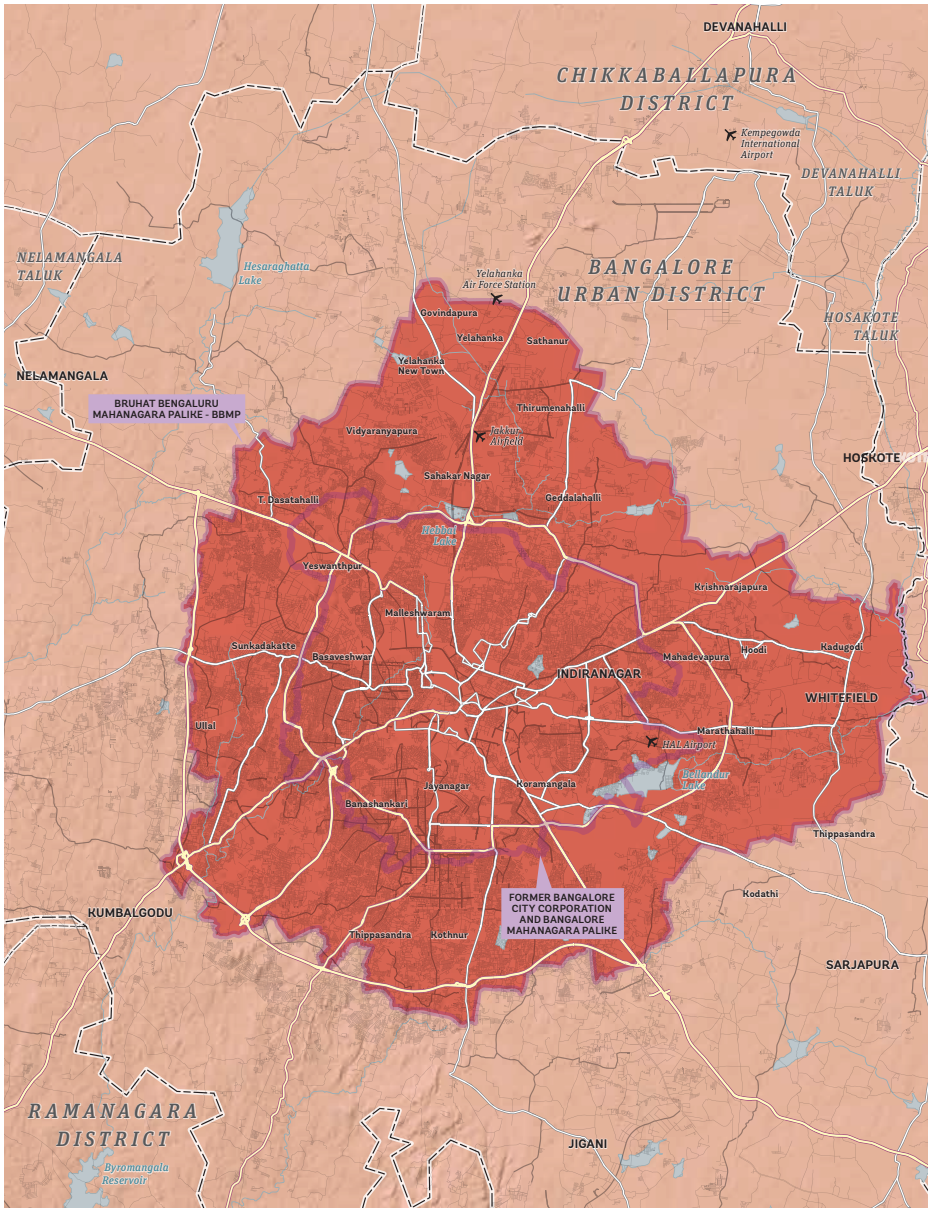
Solutions like pooled financing and improved and complete streets required coordination among multiple agencies and administrative units. Although these initiatives in Bangalore were implemented through multi-stakeholder ecosystems including government organizations, civil society organizations, and private businesses, their processes and directives remained largely top-down, both in implementing integrated urban planning solutions and, especially, in addressing challenges of inclusion. Both Tender SURE and GBWASP bear testament to this. In the case of GBWASP, an overarching agency with the mandate to address both water and sanitation across administrative jurisdictions (the BWSSB) proved efficient in delivering integrated solutions. However, an issue that plagued GBWASP was a lack of transparency in the funding, and the costs of operation and maintenance added a lack of clarity concerning coverage for the urban poor.

For Tender SURE, BBMP's administration of the initiative as a model road project has led to better scale-up. However, this approach also led to discontent among groups of citizens and elected representatives, who maintained that the process was not consultative.

In both cases, given the extensive requirement of facilitating coordination between different actors, the creation of nodal agencies was an effective mechanism. KUIDFC served as the nodal agency for coordinating finance for the GBWASP, which made sense, given the lean structure and capacities of BWSSB at the time, while BBMP was the nodal agency in charge of pilot road selection and implementation for Tender SURE.

THE FUTURE OF INTEGRATED PLANNING IN BANGALORE

Given the history of planning efforts in Bangalore juxtaposed against the challenges of its recent expansion and growth, the government realized it needed a more holistic effort to address the root cause of poor resource management,



MAP 5

BLACK CARBON

2019

PM_{25}, gridded by 0.01 degree, 2016 (μg/m³)

2.5 5.0 7.5 10 15 20 25 30 35 40

Bruhat Bengaluru Mahanagara Palike (BBMP) boundary

District boundary

Taluk boundary

Highway

Primary road

Secondary road

Residential road

SOURCES: NASA SRTM 30m; OpenStreetMap Contributors

3 KILOMETERS

MAP PROJECTION: UTM ZONE 43S, WGS-84 DATUM

service delivery, and other inefficiencies. To that end, the BBMP restructuring (BBMPr) process (2014–present) was initiated and remains the only formal effort by the government to envision the future of integrated planning in Bangalore. The BBMPr encompasses both cross-sectoral and spatial integration in service delivery within the Bangalore metropolitan area.

In 2015, with increasing public grievances about how the city was handling its finances and service provision, the government realized the need for an institutional change to deal with the multiplicity of institutions. This resulted in the Bangalore*: Way Forward Report* and the BBMP restructuring reports.

Initiated by the chief minister of Karnataka, these reports, which were created for the metropolitan area, recommended for the first time several programs and policies to improve coordination and collaboration among different government agencies and help them break out of their silos. Following the submission of this report, the government moved toward implementation of two of the 10 proposed recommendations.

First, a spatial data and information center (the Bangalore Spatial Information Centre, or BASIC) responsible for gathering and disseminating GIS-related information for the metropolitan area, is moving forward. Having a single agency responsible for spatial data should reduce the costs of procuring data and make data sets consistent.

Second, by operationalizing the proposed nodal agency, the Greater Bangalore Authority (GBA), the government would bring under one umbrella the various service-providing agencies, such as BBMP, BESCOM, and BWSSB, and BDA, the agency currently in control of land planning processes. This is a good response to the problems of accessing land for public projects following the amendments of the Land Acquisition Act in 2013, which increased the cost of procuring land by government agencies. The GBA is envisaged to have statutory powers; a GBA bill has been proposed, which may later become law. Given that this initiative is only a little over a year old, with its full implementation certain to take time, for now at least the need for integrated urban planning has been acknowledged and is being addressed.

INSIGHTS FOR THE GLOBAL SOUTH

The Bangalore case study presents several insights for other cities in the global south facing similar challenges of rapid population growth and urban expansion. The dynamics between the national, provincial, and local governments matter and require close examination. Further, nonimplementation of the 74th Amendment to the Indian Constitution, which looks to devolve power to the local scale, has resulted in weak urban local bodies across most Indian cities. Bangalore's case shows how cities can overcome this somewhat by aligning their urban development plans and projects with policies and programs at the national and provincial levels. However, the GBWASP financing experience illustrates

how market finance—when that is synonymous with commercialization without a plan for the urban poor—is problematic for supplying public goods that are viewed as basic needs. This project provides a lesson for financing agencies and urban local bodies as to when and how pooled financing for local projects can be appropriate. To sum up, the preconditions for project success are both extrinsic and intrinsic: extrinsically, they include the willingness of investors and beneficiaries, things that are out of a project planner's control, while intrinsically they include functioning nodal agencies, committees, and mechanisms, all necessary to project implementation.

Integrated urban planning in the Indian context needs a major overhaul. In Bangalore, as in other Indian cities, the power to drive action is held by the state government and, to some extent, by the municipal corporation. But given the rapid growth of the city outside municipal limits and the need to solve problems like waterlogging and waste management at the local level, there is a massive need to decentralize governance and to empower metropolitan and local wards. At the same time, there is a strong need to integrate spatial and economic development plans.

Finally, the continued availability of basic resources is key to ensuring the sustainability and liveability of a metropolitan area. While civil society organizations asking questions and demanding clarity are essential to engaging the government, there is a pressing parallel need to move toward solutions for difficult problems that cannot be solved with further capital investments. Eventually, a resource-secure future will require investing in solutions that look at reducing consumption patterns, making behavioral changes, focusing on renewable resources, and adapting legal frameworks for management, while at the same time providing equitable access to all. Sharing knowledge through live metropolitan labs, technical deep dives, and peer-to-peer learning through platforms such as the Global Platform for Sustainable Cities (GPSC)[27] will help raise awareness of potential approaches to address these pressing issues.

The Greater Bangalore Water and Sanitation Project financing experience illustrates how market finance—when that is synonymous with commercialization without a plan for the urban poor—is problematic for supplying public goods that are viewed as basic needs.

[27] GPSC is a partnership and knowledge platform that promotes integrated solutions and cutting-edge support for cities seeking to improve their urban sustainability; www.thegpsc.org/about.

Density

Bangalore's rapidly expanding metropolitan periphery has a fragmented spatial growth. Multiplicity of stakeholders are involved in service delivery across the various administrative boundaries that form the metropolitan areas. Water supply and sanitation service delivery is an example of sectoral integration that demonstrates how urban local bodies (ULBs) have collaborated across their administrative boundaries with support of state government and private organizations. Another example, of road upgrading, reveals how multiple agencies are delivering tactical urban solutions such as completing street networks.

Figure 9
POPULATION DENSITY, 2000

Municipal
- Maximum: 63,184 people/km²
- Minimum: 351 people/km²
- Average: 19,564 people/km²

Metro
- Maximum: 30,715 people/km²
- Minimum: 225 people/km²
- Average: 2,697 people/km²

Source: Population density data from LandScan 2017.

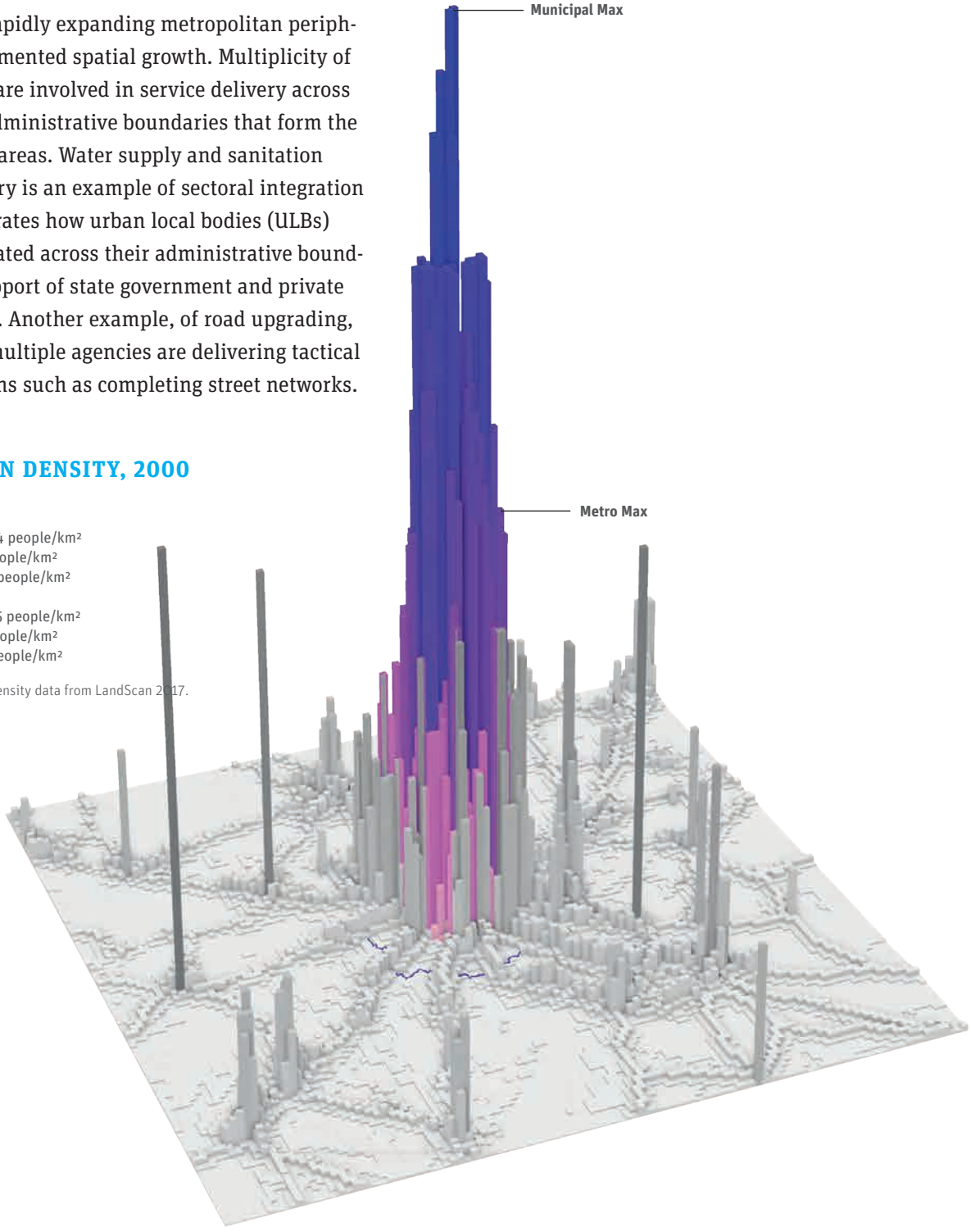


Figure 11
Overlay of density levels, 2000–2017

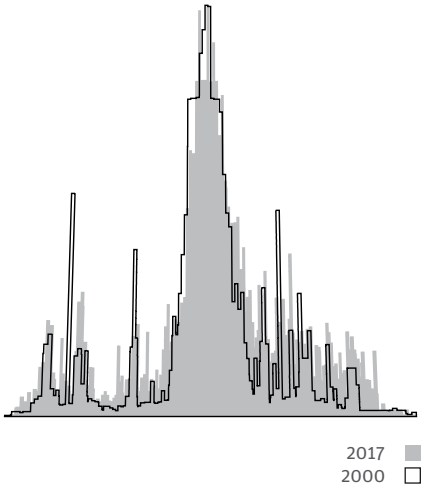


Figure 10
POPULATION DENSITY, 2017

Municipal
- Maximum: 63,185 people/km²
- Minimum: 205 people/km²
- Average: 24,173 people/km²

Metro
- Maximum: 28,785 people/km²
- Minimum: 11 people/km²
- Average: 4,440 people/km²

Source: Population density data from LandScan 2017.

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ABBREVIATIONS

ABIDe	Agenda for Bangalore Industrial Development
BASIC	Bangalore Spatial Information Centre
BBMP	Bruhat Bangalore Mahanagara Palike
BBMPr	BBMP Restructuring
BDA	Bangalore Development Authority
BESCOM	Bangalore Electricity Supply
BMRDA	Bangalore Metropolitan Region Development Authority
BMTC	Bangalore Metropolitan Transport Corporation
BWSSB	Bangalore Water Supply and Sewerage Board
CTTP	Comprehensive Transport and Traffic Plan
DEA	Department of Economic Affairs
DPC	District Planning Committee
DULT	Directorate of Urban Land and Transport
GBA	Greater Bangalore Authority
GBWASP	Greater Bangalore Water and Sanitation Project
GIS	Geographic Information System
INR	Indian Rupee
IT	Information Technology
KIADB	Karnataka Industrial Area Development Board
KUIDFC	Karnataka Urban Infrastructure & Development Finance Corporation
KWSPFT	Karnataka Water and Sanitation Pool Fund Trust
MoU	Memorandum of Understanding
Tender SURE	Tender Specifications for Urban Roads Execution
ULB	Urban Local Bodies
USAID	United States Agency for International Development
USD	United States Dollar
WRI	World Resources Institute

Currency exchange rate: 1 USD = INR 68.45 (July 2019).

GREATER THAN PARTS

A Metropolitan Opportunity

How rapidly growing cities utilize integrated planning to decarbonize urbanization

Cities are the source of over 70 percent of the world's greenhouse gas emissions. Cities are also the engines of the global economy, concentrating more than half the world's population. By the year 2050, two-thirds of the world will be urban, with cities accommodating an additional 2.5 billion people over today's total. Nearly all of this urban growth will occur in developing countries. This concentration of people and assets also means that the impacts of natural disasters, exacerbated by the changing climate, may be even more devastating, both in terms of human lives lost and economic livelihoods destroyed. Earth is on a trajectory of warming more than 1.5°C unless important decarbonizing steps are taken.

Often urban policymakers prescribe integration as the solution to steering urbanization towards decarbonization to achieve greater global and local environmental benefits. However, little is known about the struggles—and successes—that cities in developing countries have in planning, financing, and implementing integrated urban solutions.

Greater Than Parts: A Metropolitan Opportunity presents nine diverse metropolitan areas as individual case studies each with a selection of urban innovations. From the analysis, the report derives models, poses guiding questions, and presents key principles to provoke and inspire action by cities around the world.

The main objective of this report is to understand how developing and emerging economies are successfully utilizing *horizontal integration*—across multiple infrastructure sectors and systems—at the metropolitan scale to deliver greater sustainability. Integrated planning processes extending well beyond city boundaries are examined to determine how they have been financed and implemented. The report's primary audience is therefore city decision makers, their financiers, technical advisers, and practitioners most interested in applying integrated approaches to sustainable urban planning in capacity-constrained environments.

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SUSTAINABLE DEVELOPMENT GOALS

11 SUSTAINABLE CITIES AND COMMUNITIES