Bangalore Challenges and Responses

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The process of globalisation has resulted in the accelerated growth and functional diversification of many large cities of the developing world (the so called megacities). While this development has created opportunities for economic growth and improvement in the standard of living (at least for some) it has also presented significant planning challenges for those government-based authorities charged with the responsibility of providing basic infrastructure and services. Bangalore, the capital of Karnataka state in southern India is an example of a mega-city struggling to cope with a range of challenges resulting from the city’s integration into the global economy. These challenges include coping with the consequences of rapid urbanisation – access to clean water, sanitation services, healthcare, and the provision of urban transport infrastructure. A range of responses, initiated by governments, non-government organisations, and community-based (often self-help) associations, have been implemented to address these concerns. The effectiveness of these responses is largely determined by the degree to which they address the underlying dynamics of change and the extent to which they empower local communities to take ownership of the decision-making processes that ultimately impact on the quality of their lives. It is clear that effective governance and the transparency and accountability of decision-making processes are essential if lasting solutions are to be found to the challenges facing developing cities such as Bangalore.
Bangalore: Challenges and responses

Introduction

When we think of Bangalore the image that comes to mind is that of a bustling developing world city whose recent economic success has been built on information technology outsourcing, the development of call centres and the clustering of firms producing industrial products and consumer durables using relatively cheap labour.

In reality, Bangalore – the capital of the state of Karnataka located in southern India – is a highly complex city which has experienced the apparent benefits of globalisation and economic change on one hand, whilst having to contend with the challenges posed by inadequate infrastructure, pollution, traffic congestion and growing inequalities in wealth distribution, on the other. Despite the benefits derived from the city’s IT-led economic boom in recent decades, the development of Bangalore has clearly been environmentally and socially unsustainable. In addition, the benefits of economic growth – job creation, regional development and increased economic exchange with other countries – have not been evenly distributed across the population. This has created serious challenges for national, state and local governments.

The body of work on the planning issues facing mega-cities is substantial. There are, however, relatively few studies that focus on the challenges experienced by specific urban entities and the range of responses deployed by individuals, groups and governments that address these issues. The most detailed and recent research focusing on the impacts of globalisation on the growth and development of mega-cities is that conducted by Mandon (1997) and Mandon and Sahay (2000 & 2001). These studies examine the importance of the local environment in influencing the ability of IT firms in Bangalore to participate in global activities (Mandon, 1997) and the issues that arise from Bangalore’s role as a link between global and local networks of exchange (Mandon & Sahay, 2001). Other relevant themes examined in the literature include the growth of information technology clusters in the city (Heitzman, 2001; Parthasarathy, 2004; Stremlau, 1996; Van Dijk, 2003); attempts by public service providers and intergovernmental organisations to improve water and sanitation conditions in Bangalore (AusAID, 2000a; Connors, 2005; Nagendra, 1999; World Bank, 2006b); and ‘report cards’ on the state of public services (Balakrishnan & Iyer, 1998; Paul, 2006; Paul, Balakrishnan, K.Gopakumar, Sekhar, & Vivekananda, 2005; Paul, Balakrishnan, Thampi, Sekhar, & Vivekananda, 2006; Ravindra, 2005). In addition, there are a range of government reports, including the Comprehensive Development Plan (BDA, 2005) and the City Development Plan (Karnataka Urban Infrastructure and Development Corporation, 2006), that provide detailed information regarding the government’s intended response to issues of landuse planning and infrastructure development in Bangalore city.

This case study builds on this body of work by examining Bangalore as a mega-city attempting to adjust to the challenges resulting from its integration into the
global economy. The challenges addressed include traffic congestion, water reticulation, sanitation and the provision of healthcare. In doing so it evaluates the effectiveness of strategies implemented by a range of stakeholders (including governments, non-government organisations and individuals).

The data on which this study is based was collected via a number of structured and semi-structured interviews conducted in Bangalore in late 2006. Those interviewed included senior officers of the relevant stakeholders. This approach enabled the gathering of first-hand insights into the nature of the challenges being experienced by the city and the range of strategies employed to address these concerns.

The paper is organised into three main sections. The first offers a short ‘generic’ overview of the significance of mega-cities in the global economy, with specific attention given to Bangalore’s economic development over time. The second section deals with the specific challenges arising from Bangalore’s recent economic growth while the third section presents (and evaluates) the responses of government, NGOs, inter-governmental organisations and individuals.

**Bangalore, mega-cities and globalisation**

By 2007, 50 per cent of the world’s population will be living in urban places and this figure is likely to be as high as 60 per cent by 2030 (United Nations Population Division, 2002). The UN predicts that almost all of the urban growth over the next 25 years is likely to take place in the cities of the developing world. This trend will result in a reordering of the hierarchy of the world’s largest cities. Developed world cities such as London and New York will move down the rank in order to make room for cities such as Dhaka, Mumbai, Delhi, Sao Paulo and Mexico City. By 2015, eight of the world’s ten largest cities will be located in developing countries. According to Lule (n.d.) more than half of the world’s population will be living in the cities of the developing world by 2035.

The UN refers to the largest of these urban areas as ‘mega-cities’ (defined as urban agglomerations with more than 10 million people). According to Madon and Sahay (2000) high rates of urbanisation create both opportunities and significant challenges for these large urban agglomerations. On one hand, the large population base provides an important human resource for improving levels of economic growth. By harnessing the knowledge and skills of this human resource base, cities can position themselves to take advantage of the significant advantages presented by the growth in global economic activity. On the other hand, rapidly increasing urban populations can place a significant strain on the civic, economic and social infrastructure of the city (Madon & Sahay, 2002). This can, in turn, result in a severe lack of affordable housing (particularly for the urban poor), highly congested roads, adverse impacts on the biophysical environment and serious deficiencies in the provision of water, sanitation and health services.

(Bugliarello, 1999) outlines three important reasons why the international community should pay attention to the trends that are taking place in mega-cities:
First, what happens in mega-cities affects the rest of the world; second, mega-cities are key instruments of both social and economic development; and third, mega-cities represent market opportunities for both developing and developed countries alike.

Official estimates of Bangalore’s population fall short of the UN’s arbitrarily determined 10 million threshold. Recent population projections, however, indicate that Bangalore will reach this threshold population by 2020 (BDA, 2005).

At the time of the 2001 census the population of the metropolitan area of Bangalore was 5.7 million, which is added to by a transient, or ‘floating’ population of approximately 1-2 million (World Bank, 2005, p. 14). When ‘Greater Bangalore’ – the integrated city core and eight surrounding municipal areas – is taken into account, the city’s population exceeds 7–7.5 million people. Bangalore is currently ranked as India’s third largest city and fifth largest metropolitan area. However, it is important to note that the population of the metropolitan area can be difficult to determine because of the transient nature of the slum population. Squatter settlements, which account for 15–20 per cent of the city’s population, are principally located on the city’s periphery. The highly congested city centre has few areas of land able to accommodate such housing. (AusAID, 2000a).

The integration of Bangalore into the global economy has been the leading driver of the city’s population growth over the past 20 years. Between 1951 and 1971 the city doubled in population and in the decade that followed, the population almost doubled again (Connors, 2005). It has been estimated that approximately 61 per cent of this growth was due to rural-urban migration (AusAID, 2000a, p. 5). Bangalore highlights a number of characteristics typical of mega-cities in the developing world. One of these characteristics is the city’s very high rate of population growth (now 3.35% per annum, down from 4.9% in the 1990’s). This ranks Bangalore as one of the fastest growing cities in Asia. This rate of growth is particularly high when compared with Sydney’s annual growth rate of only 0.74% (2004-05).

**The emergence of Bangalore as India’s ‘Silicon Valley’**

Before addressing the challenges confronting Bangalore, it is important to have an understanding of the history of the city’s growth. Bangalore – which dates from 1537 – first came to prominence as a centre for silk and textile manufacturing and trade. The establishment of a British garrison in 1799 further strengthened the city’s reputation as a manufacturing centre. This industrialisation continued throughout the 19th and into the 20th century. On the granting of Indian independence in 1947, the country’s first Prime Minister, Jawaharlal Nehru, designated Bangalore a ‘city of the future’. This act initiated a 40-year period during which programs were implemented to build the intellectual capital of the city. This included the construction of large-scale research and production facilities along with the establishment of several military and space research centers (Dittrich, n.d.). During this period, the national government also
established a number of large public sector factories including Bharat Earth Movers, Bharat Electronics and the Indian Telephone Industries (Van Dijk, 2003). The presence of these corporate entities helped to build a strong managerial and technical skills base in the city.

In today’s post-industrial economy – characterised by the growing importance of the information and producer service sectors – the city has emerged as the base for some of India's premier scientific organisations, three universities and numerous engineering colleges and research institutes specialising in aerospace, information technology and biotechnology. Examples of research organisations located in Bangalore include the Indian Institute of Science, Indian Institute of Management, the Centre for Artificial Intelligence and Robotics and the National Centre for Biological Sciences. Bangalore accounts for 47 per cent, or 127 of the approximately 265 biotechnology companies in India (Van Dijk, 2003).

Since the ‘liberation’ of the economy in the early 1990’s, Bangalore has emerged as a major centre for IT related industries. Examples of these activities include back-office administration for the finance and banking sectors; software research, development and support services; and computer aided design services for the engineering sector.

Van Dijk (2003) outlines a number of reasons for the phenomenal growth of the IT sector in Bangalore. These reasons include: the favourable climate of the area; the availability of a highly trained workforce (many trained in public sector companies); government initiatives to promote research and development as well as foreign investment in the city; the relatively low cost of labour (wages are one fifth of the salaries in developed countries); the cosmopolitan character of the city (the result of rapid inward migration) and the high quality of life that can be enjoyed in the city; the presence of excellent research and training facilities; and improvements in satellite communications that facilitated the outsourcing of service related activities from developed countries, most notably the United States of America. The time difference from the US is also ideal for 24-hour business operations. Businesses can finish work at the end of the day, send tasks by satellite to India and have the jobs returned to them before the start of business the following day. India now accounts for 60 per cent of all software exports to the US (Van Dijk, 2003, p. 94).

The growth of the chemicals, automotive, electronics and IT sectors, combined with the city’s favorable climate and skilled workforce, have made Bangalore a magnet for rural-urban migration. The city’s growing reputation as India’s ‘Silicon Valley’ has encouraged many young professionals, together with the unskilled, to move to the city in search of employment in manufacturing and service-related industries.

It is important to note that economic success has not been the only factor promoting rapid migration into Bangalore. Other ‘push’ factors such as rural poverty and unemployment have also played an important role in the city’s growth. According to a spokesperson for one prominent NGO based in Bangalore:
People leave their homes [in rural areas] because there are no jobs or there is not enough growth in the agricultural sector and services in the small towns and villages. The services are so poor that the educated want to come here.

As already noted, the rapid population growth experienced by Bangalore over the past 20 years has presented significant challenges for the city’s planning and administrative authorities. In the discussion that follows, a number of these issues will be discussed and selected responses by governments, NGOs and individuals outlined and evaluated.

**Bangalore’s principal urban challenges**

**The utility infrastructure deficit and its impact on public health**

Diarrhea, upper respiratory infections, the common cold, fever, tuberculosis, and dengue fever are major public health problems in Bangalore and their incidence is closely related to the general living conditions of the urban poor and the level of access they have to adequate water and sanitation services.

The NGOs working in the health sector argue that the government and its agencies have not dealt adequately with these health-related problems because the public health system has the ‘wrong’ focus. There is, they argue, a preoccupation with provision of family planning and welfare services, and the treatment of disease, at the expense of addressing underlying health issues. A spokesperson for one of the specialist NGOs working in the health sector noted that:

*The increasing allocation of funds for medicines and family planning services seems to be doing little to deal with the underlying causes of ill-health in Bangalore.*

Data collected during the semi-structured interviews suggests that this situation has been made worse by the ‘corporatisation’ of healthcare in India. This development has tended to reinforce the focus on treating disease rather than addressing the underlying determinants of health. It is not uncommon, for example, for patients to be prescribed drugs that are not necessary and to be referred for services including surgery that they do not need. One public health official, who did not want to be identified, admitted that there had been maternity cases where patients had been referred for a caesarean section when they arrived at hospital to have their baby delivered simply because of the revenue the doctor could derive from the procedure (5,000–20,000 rupees). According to one NGO representative:

*The city is being flooded with private hospitals and people are being taken for a ride … The result of this is that patients are being written irrational prescriptions, unethical drug trials are being undertaken and the health of the population is suffering.*
In addition, the demand for health services significantly outstrips the ability of the system to provide comprehensive health support for the growing population. According to Civic Bangalore (2006):

*People badly need the system but when they go there they are not assured of even minimal services.*

This shortage of resources results in an environment where patients are forced to pay bribes to receive supposedly free services in public hospitals. The Public Affairs Centre, a prominent NGO working in Bangalore, recently conducted a study of maternity homes and found that on average:

*If you were to pay a bribe for everything that people are being asked to pay bribes for, you would end up paying about 1,300 rupees for a stay in the hospital for the delivery of a child.* (Sekhar, personal communication, 2006)

To avoid such corruption, an increasing proportion of the urban poor (which represent approximately 33% of the city’s population) are making use of the private hospital system. This trend concerns NGOs working in the health area. Many of the doctors in these hospitals are inadequately qualified and do not provide the level of care that patients are entitled to receive.

Many of the preventable diseases impacting on the quality of life experienced by those living in Bangalore can be traced to the city’s inadequate water and sanitation infrastructure. Together, these constitute two of the most important challenges facing Bangalore. Census data from 1991 and 2001 indicates that the proportion of households with direct access to sanitation services has remained at approximately 60 per cent over the past decade. This produces a bleak picture of a divided city in terms of access to the basic living necessities. The limitations of the existing sewage infrastructure are highlighted by the *City Development Plan for Bangalore* (2006) which states that nearly 50 per cent of sewerage generated within the Bangalore system is released untreated into receiving waters (Karnataka Urban Infrastructure and Development Corporation, 2006, p. 46).

Some of the key challenges faced by Bangalore in terms of water and sanitation include water source availability and water supply and sewerage system deficiencies and related management issues.

- **Water source availability** There are a number of issues regarding the availability of potable water. As noted by (Thippeswammy, 2006), and various NGOs, Bangalore’s water supply is dependent on groundwater reserves and two rivers, the most important of which is the Cauvery River. The available water supply from these sources is limited and the current demand of 975ML per day outstrips the available supply of 810ML per day. This water supply issue is exacerbated by the relatively long distance (98km) to a perennial water source and the large elevation difference between the main water source (the Cauvery River) and the city (490 metres). These factors combine to make the transport of water to the city an energy intensive and expensive operation. Other water sources in Bangalore
are also problematic because there has been a systematic depletion and contamination of existing local groundwater sources resulting from a lack of adequate controls and regulation.

- **Water supply and sewerage system deficiencies** In addition to the significant water resource problems, and in the light of the explosive rate of population growth in Bangalore, a number of issues relating to water supply and sanitation system deficiencies have been identified. First, the intermittent and uneven supply of water in the city resulting from the insufficient capacity of the carrier main and daily demand storage capacity of the system. Many of households in Bangalore can access water on alternate days for only a few hours (World Bank, 2006a, p. 13). A further concern is the large proportion (30–40%) of the city’s water supply that is unaccounted for – a result of illegal connections and leakages (Ravindra, 2005). Second, there are important water quality issues. Faecal contamination of the water supply occurs due to overflows from the sewer system during periods of lower and negative pressure caused by intermittent supply issues. It is also likely that urbanisation of the Cauvery River catchment will have a detrimental impact on the quality of water sourced from this supply in the future, if strict development controls are not applied. Each of the trends outlined above are likely to be further exacerbated by Bangalore’s rapid rate of population growth and the increased demand for water resources that this has created.

- **Sewer system capacity and maintenance issues** The capacity of the existing sewage infrastructure, which, according to (Ravindra, 2005), caters for only 60 per cent of the population, has been stretched by the demographic and spatial growth of the city. The system’s problems include the surge in sewer inflow during the rainy season. This, in turn, results in 50 per cent of sewage being discharged into waterways and the flooding of many low-lying slum districts. Other problems include insufficient capacity of the existing sewers resulting in overflow from manholes and the encroachment of residential areas on sewer lines and manholes causing blockages in the system.

In addition to these sewer system capacity constraints there are also important maintenance issues that need to be addressed. These include an aging sewage system infrastructure that no longer has the in-built potential capacity to cater for the needs of the rapidly growing population; the presence of open sewerage drains that have potentially hazardous health impacts; poorly maintained pipes which result in the silting of sewers and sewerage overflow from manholes into the storm water system (relatively large volumes of silt, grease and floating debris in wastewater results in inefficient and costly primary and secondary treatment); and lack of maintenance of toilets, absence of toilets and long distance to toilets. For the city’s urban poor this is a major problem (Paul & Sekhar, 2000). Public toilets constructed in slums are often located at the edges of these communities for reasons of hygiene and lack of space in the central slum area (AusAID, 2000b, p. 10).
Responding to the utility infrastructure needs of Bangalore

Community Health Cell (CHC) – a voluntary professional support group for public and community health – has developed a number of initiatives to address the challenges experienced by the city’s healthcare sector. One of the organisation’s key strategies has been to facilitate the development of networks involving community groups and other NGOs. The aim of such networks is to ensure that all relevant parties are informed regarding the realities of Bangalore’s healthcare system and are adequately equipped to mobilise community action.

Measures undertaken by the CHC in partnership with other key NGOs in Bangalore include: the promotion of primary health care services for the urban poor (this involves moving beyond a strictly curative approach to incorporate a focus on disease prevention and health promotion); the education of residents and NGOs regarding the key determinants of urban health and the measures that can be taken to address these (according to one of the researchers for this NGO, the underlying conditions that restrain health include: overcrowded living conditions, lack of access to potable water and sanitation services, inadequate housing, poor nutritional status, low incomes, and alcoholism); providing the community with the knowledge and skills that they require to assess the quality of the health care that they are receiving and assert their collective rights to adequate living conditions and health services; the promotion of increased civic participation and community involvement in health care planning and transparent and accountable decision making practices in government departments; monitoring the unethical and illegal practices of some health providers; and lobbying for mechanisms to be put in place to address complaints regarding denial of access to, or ineffective health care at all levels of government.

According to one of the CHC’s key researchers, the effectiveness of responses to health challenges in Bangalore can be measured by their ability to address the underlying determinants of health and the degree to which these responses provide a focus on comprehensive primary healthcare. Strategies that fail to address these issues are unlikely to result in sustainable improvements in the health status of the population.

Governmental responses to the water supply issues outlined above have been primarily driven by a focus on large public infrastructure projects such as the Cauvery River Water Supply Augmentation Scheme. The government has developed a four-stage water supply upgrade to be completed over the next five years. This plan will have an ultimate capacity of some 1430 ML/day. However, based on current population projections, by the time Stage 4 (Phase II) of the scheme is completed, the actual day demand projection will have increased to approximately 2200 ML/day. At this rate the average per capita water supply will drop to approximately 65 per cent of the national standard by 2012 (currently it stands at 83%).

At the same time, water infrastructure upgrading is taking place in order to limit system insufficiencies and to arrest the loss of water through illegal connections and leakage. This initiative will also address some of the water quality problems
by limiting infiltration. According to Mr. NM Thippeswammy, the former Chief Engineer of the Bangalore Water Supply and Sewerage Board (BWSSB) there is:

... a tremendous additional requirement for augmenting the growth of the city. For this, we must look at alternative sources also, these include rainwater harvesting, recycling of wastewater, aquifer recharging and also reduce the unaccounted for water – losses in the system.

To address this particular concern, the Bangalore Water Supply and Sewerage Board (BWSSB) has initiated research into a number of alternative strategies for augmenting the city’s water supply. The harvesting of rainwater is one of these strategies. On 6 June 2004, Bangalore became the first city in Karnataka state to include rainwater harvesting in its bylaws. These bylaws make rainwater-harvesting mandatory in all new buildings in the city. Residents are also able to obtain subsidies from the City Corporation for installing rainwater-harvesting systems. Despite the existence of this bylaw Bangalore’s Centre for Sustainable Development note in their Environment Report Card Survey that only 0.7 per cent of households use rainwater harvesting measures and approximately 5 per cent of schools capture rainwater (Ravindra, 2005). To make the most of stormwater runoff, the BWSSB is investigating the potential of diverting water from the urban area into lakes around the city where it can be used for both potable and non-potable purposes. This initiative will also involve the remodeling of the existing sewerage system to stop the flow of sewerage into stormwater drains (BWSSB, 2006).

A number of NGOs have been working to promote the conservation of water in Bangalore. One particular organisation – the Rainwater Club – is made up of architects and engineers who seek to make politicians, and the general public, more aware of the benefits and applications of rainwater-harvesting. The organisation, which was founded in 1995, has produced a book that outlines the key principles of rainwater harvesting and provides local rainfall data. Armed with this information, communities are able to design rainwater-harvesting systems to best meet their local needs.

The Rainwater Club, together with the Rayapuram Slum Development Society (a local NGO), has been involved in promoting the use of rainwater tanks as a simple technological solution to the water access problems experienced by slum communities. These organisations have been able to demonstrate to slum communities the ways in which water can be gathered from the relatively small rooftops of slum houses (approximately 120 square feet) and collected into 500 litre tanks. As a result of the support of these two NGOs the women of the Chamarajpet slum community in Bangalore have been able to connect more than 200 homes with rainwater storage devices.

Another example of a recently successful strategy to improve water supply and sanitation services for the urban poor was the AusAID financed, Bangalore Water Supply and Environmental Sanitation Masterplan Project (AusAID, 2000a). This
initiative involved the provision of practical, convenient and legal water supply and sanitation facilities within three diverse pilot slum communities in different regions of the city. These individual household connections and community level services were accompanied by the phasing out of public taps and fountains. The success story here is the well-targeted aid funding combined with a high degree of community involvement facilitated through local NGOs.

Due to the success of the initial AusAID masterplan, the BWSSB and Bangalore City Corporation have replicated and up-scaled the essential elements of the AusAID pilot project to extend water supply and underground sewerage services to all areas of the city. These ongoing successes have encouraged further foreign investment in the infrastructure roll-out including involvement of the Japan Bank of International Cooperation (JBIC) which has helped finance the upcoming stages of the water and sewerage infrastructure program.

In addition to the provision of services for the urban poor, the government has put in place monitoring, maintenance and augmentation schemes for the existing sewerage system to ensure that the infrastructure continues to operate efficiently and is kept in good repair. Large tertiary treatment plants are planned. These will enable wastewater to be used for a range of non-potable applications throughout the city.

**Urban transport infrastructure**

Rapid urbanisation, coupled with the economic and spatial growth of Bangalore, has placed enormous strain on the city’s transport infrastructure. The rapid growth in vehicle numbers, combined with the constraints imposed by the city’s road infrastructure, has resulted in severe traffic congestion on the city’s roads. The key transport-related challenges include: high traffic loads, increased travel times, mixed modes of transport competing for space, poor road infrastructure and a lack of adequate public transport.

Rising average incomes combined with changing lifestyle expectations and rapid population growth have resulted in an average 10 per cent annual increase in motor vehicle ownership (Ravindra, 2005). This growth is significant, especially when compared with a population growth rate of 3–4 per cent (Karnataka Urban Infrastructure and Development Corporation, 2006). These trends have resulted in traffic loads significantly greater than the existing road infrastructure can accommodate. It was, for example, noted by one state government official that:

> The 2.5 million vehicles on the city’s roads represent approximately four times the carrying capacity of the road network.

Another key concern is the increase in travel times resulting from the ever-expanding volume of traffic. Morning peak-hour, for example, now extends for three and a half hours, with a typical 15km commuter journey increasing to around 90 minutes. Peak-hour conditions are made worse by the mixed modes of transport that compete for space on the city’s roads and the inadequacy of public transport. Public transport in the city is restricted to buses which account for less than 1 per cent of the traffic volumes but carry more than 40 per cent of the
traveling population (World Bank, 2005, p. 14). These buses are required to compete with cars, two wheelers, trucks and auto rickshaws on the city’s narrow roads. This has been made worse by the lack of ‘offline’ transit corridors within the city. The result is longer travel times, severe congestion, reduced mobility and increased air and noise pollution. Compounding the city’s transport woes is the trend away from public transport towards an increased reliance on private transport – a result of rising average incomes and the perceived social stigma associated with bus travel. This trend has the potential to further exacerbate the problems of traffic congestion in the city.

The condition of the basic road infrastructure is another key challenge faced by the residents of Bangalore. Problems with the road infrastructure include: poor surfaces; lack of signalised intersections and inadequate corridor widths. In addition, the creation of new infrastructure is hampered by a lack of transparency in government and in procurement systems for new roads and road improvements. Reports persist that many of the contractors working on projects financed by the World Bank have been slow to complete road upgrades in the city (Iype, 2005). The city also has a poor road network design including a radial road layout with limited links between the major corridors. The problem of congestion on these roads is further exacerbated by the concentration of employment in the inner city.

Typical of the responses to the transport infrastructure needs of Bangalore initiated by government are the series of concentric ring roads for the city currently under construction (core, inner, outer and peripheral). These ring roads will provide much needed links within the radial road network. The peripheral ring road is designed to enable tucks to bypass the city and to facilitate the construction of five satellite towns, which will act as decentralized ‘town centres’. This will further help to ease core congestion.

Other initiatives include: a mass rapid transit system or ‘metro’ which aims to reduce traffic congestion, fuel consumption, strain on roads travel times and pollution; a 10 km elevated freeway along Hosur Road to Electronic City (one of the key centres of IT-based services in Bangalore); a bus rapid transit system including dedicated bus ways with their own rights of way to bus services; twenty-seven high density truck corridors to increase the traffic flow and decrease the conflicts between different modes of transport; up to 22 flyovers/grade separators to reduce junction conflicts; and the Bangalore-Mysore Infrastructure Corridor – an project to improve transport links between the two cities and facilitate the decentralisation of population from Bangalore.

Regulatory changes go hand in hand with infrastructure changes. Examples of the initiatives for improving traffic conditions in Bangalore have been outlined in detail in two important policy documents compiled by the Government of Karnataka: The Chief Minister’s 10-point Programme for the Improvement of Bangalore City Traffic (Government of Karnataka, 2006b); and B-TRAC 2010 Bangalore Traffic Improvement program (Government of Karnataka, 2006a). Some of the proposed and existing regulatory changes include: restrictions on trucks using ring-roads during the morning peak periods (7.00am-11.00am); the
establishment of a coordinated traffic management system; plans for dedicated busways; and the strengthening of traffic police numbers and infrastructure.

More localised initiatives to improve traffic conditions have also been introduced including the conversion of roads to one way traffic corridors; improvements in road signage; upgrading of intersection controls by introducing signalisation; and education campaigns addressing issues of road safety and compliance with road rules. It is important to note, however, that despite these initiatives there are groups in Bangalore that are critical of the government’s response. Some NGOs have suggested that government initiatives have favored private vehicles over public transport by prioritising road network upgrades and large-scale infrastructure projects over public transport solutions. The argument has been made that it would be more beneficial and cost effective to build a circular railway network serviced by feeder buses than construct peripheral ring roads and elevated freeway system that cater for private motor vehicles. The government has also faced significant criticism from both NGOs and the media regarding the management of the Bangalore-Mysore Infrastructure corridor project. Many NGOs believe that this project has been associated with excessive land acquisitions on terms very favourable for developers.

H.S. Balram, in an editorial taken from the *Sunday Times of India*, 30 July 2006, summarises the views of many of those interviewed regarding the maintenance of Bangalore’s roads:

> Roads continue to be in bad shape with contractors and government engineers doing a shoddy job and siphoning off tax payers’ money... A committee appointed by the high court has come down heavily on consultants, contractors, ward engineers and accountant staff for poor quality of road works. It says mismanagement of funds and administrative irregularities are the bane of Bangalore’s roads’ (Balram, 2006).

In addition to the above, elements of the government’s traffic planning approach have been criticized by prominent intergovernmental organisations (IGOs) such as the (World Bank, 2005) which contends that the government’s approach has been biased towards augmenting the capacity of the existing road network with capital intensive infrastructure projects (e.g. elevated freeways) rather than seeking to restrain the use of private motor vehicles. They go on to state that the government’s approach seriously neglects the mobility of low income and poor commuters particularly pedestrians and cyclists (World Bank, 2005, p. 7). These are serious concerns that need to be taken into account when assessing the appropriateness of the government’s response to the challenges of urban transport in Bangalore.

The NGO, CIVIC Bangalore, provides an example of the way in which non-government organisations have responded to traffic management issues in Bangalore. One of the key initiatives put in place by CIVIC was to hold public hearings regarding key issues in the selection of options for a Mass Rapid
Transport System. The aim of these hearings was to facilitate dialogue and debate that would enable all of the public transport options to be presented and their various merits evaluated. The NGO hoped that by informing the public of the issues involved they would be in a better position to engage in the public debate and lobby for models of transport change that were in the best interests of the whole community. Such forums were open for anyone to attend including government officials, non-government organisations and concerned citizens. Other strategies employed by CIVIC include the formation of a specialist subgroup on traffic and ‘improving public transportation in Bangalore’. This subgroup consulted with representatives of the relevant transport authorities and encouraged citizens to attend meetings and voice concerns. The media was also invited to attend these meetings in order to disseminate the information presented to the wider community. Members of the traffic subgroup were also involved in several transport related groups outside of CIVIC such as the ‘road users safety group’.

One of the key aims of the CIVIC public hearings was to increase the level of public awareness regarding the key urban transport issues affecting the city and to empower citizens to demand greater transparency and accountability from government in the transport planning process. As one representative of the NGO explained:

The aim was to improve the quality of service as well as the affordability (of public transport) and serve the needs of all of the customers, not just those wanting flyovers...

In terms of improving civic participation, the approach adopted by this NGO is seen to have been relatively successful. Members of the forum were able to ask key questions of government representatives and question the sustainability of the various public transport proposals put forward. In addition, the NGO also claims that, as a result of the forum, they were able to expose some of the limitations of the data that the government had been using to justify various proposals and that this had enhanced the clarity of the decision-making process. Important advice regarding the facilitation of effective public meetings is provided by Prasanna et al. (n.d.) who note that “public meetings by themselves do not solve or resolve any problems”. There is a need to organise and guide the process of discussion and negotiation towards a constructive endpoint if tangible outcomes are to be achieved (Prasanna, Aundhe, & Saldanha, n.d.).

When discussing responses to the challenges of traffic in Bangalore, it is important to be aware of the initiatives that NGOs have put in place to monitor and improve the quality of public service provision within the city including the quality of public transport services. A key initiative in this area has been the initiation of the Citizen Report Card approach by the Public Affairs Centre (PAC). The Citizen Report cards, first published in 1993, provide an overview of the performance of 14–15 public utilities as judged by the users of public services – residents from both slum and general households in Bangalore. The Citizen Report card approach involves a multi-tiered strategy that goes beyond the
collection of survey data and compilation of reports. The Public Affairs Centre interacts with public service providers to inform them of the user feedback and to discuss measures that could be undertaken to improve the quality of the services provided. This approach has resulted in positive changes in the behaviour of both the users of public services and the public utilities themselves. One beneficial impact of the publishing of ratings for individual service providers has been the stimulation of competition between the various public utilities, many of which have become increasingly interested in the feedback from the PAC surveys. This feedback has provided public utilities with benchmark criteria that they can use to assess the effectiveness of their internal policies and processes and to track service improvements over time. The Citizen Report Card process has also given residents a voice and has empowered them with the information required to demand better quality services from public utilities. The final measure of the effectiveness of the Citizen Report Card approach has been the noticeable improvement in the service delivery reported by residents of general households over the past decade (Sekhar & Shah, 2006). Feedback from the Citizen Report Cards has resulted in the simplification of procedures and introduction of information technology to a number of government processes. These trends have led to improvements in the transparency and accountability of most government service providers.

It is important to note that despite the above criticisms of the government’s approach to resolving traffic issues in Bangalore, the results of the most recent Citizens Report Card, published by the Public Affairs Centre, indicates that 95 per cent of the residents believe that the construction of ring roads and grade separated junctions (fly-overs) has helped to ease traffic congestion in the city (Sekhar & Manisha, 2006, p. 25).

Conclusion

This examination of the challenges experienced by Bangalore reveals that the effectiveness of governmental responses has been limited by a preference for expensive, large-scale infrastructure projects. This type of response is especially limiting when they target the symptoms rather than the underlying causes of the challenge. This was a commonly expressed view among the NGOs, government officials and residents interviewed during the course of this study.

When evaluating the responses of government departments it is important to keep in mind that the rapid spatial, economic and demographic growth in the city has resulted in a number of complex and simultaneous challenges that need to be managed. This has put significant strain on the ability of individual government departments to provide an immediate and effective response to these issues. However, having said this, there is a range of organisational and procedural concerns identified throughout the study that have a significant impact on the effectiveness the government’s response. These include: the adequacy of communication flows between government departments and the need for increased inter-departmental coordination; levels of transparency and accountability; the dominance of the state government in local planning decisions;
and distortions in resource allocation resulting from corruption and the low levels of effective civic participation in decision-making processes. The frequency of comments such as these from NGOs, residents and government officials alike suggest that these issues are real and that they need to be addressed as an immediate priority if the significant public health and infrastructural challenges are to be effectively managed into the future.

In addition to the above, the data gathered during the course of the research indicates that initiatives undertaken by NGOs and IGOs tend to be most effective when they incorporate a number of key features in their project design. These features include detailed and ongoing consultation with individual communities including the identification of their individual needs and the careful tailoring of programs to address these needs. This is often achieved through the involvement of local NGOs who have an existing working relationship with, and knowledge of, individual communities. The findings of the research also indicate that programs can be very effective when they are carefully targeted to address the key determinants of quality of life including access to housing, potable water, sanitation, employment, sustainable and nutritious food sources and health services.

This case study illustrates the importance of involving communities in the planning and implementation of programs. It is widely seen as being central to the success of initiatives designed to address the challenges of balancing economic growth with social and environmental sustainability. The comments of individual residents indicate that close community involvement in these projects helps foster a sense of community ownership that results in lasting (sustainable) improvements in standards of living. Such programs empower local communities by providing them with the skills and knowledge needed to build ‘self-help’ groups that can assert their rights and effectively negotiate with relevant government departments to ensure that future development initiatives are in their best interests. It is self evident that the residents of Bangalore would greatly benefit from a continued and enhanced focus by the government on environmental and social justice concerns.

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