

# sustainabletransport

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**ITDP** *Institute for Transportation & Development Policy*

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**Inset:** *Tearing down the elevated highway before the  
restoration. (Source: Young-Joon Sunwoo)*

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## You Don't Need a Weatherman to Know Which Way the Wind Blows



**F**or years, people knew it was possible that a major storm could inundate New Orleans. Still, the chances seemed remote, until Hurricane Katrina created a million homeless people overnight. For years, people have suspected that global warming may be melting the polar ice caps and raising ocean temperatures. Today, the link between fossil fuel consumption, global warming, and the growing severity of storms is increasingly clear.

However, writers like Michael Crichton, in *State of Fear*, claim there is no evidence that global warming is a real problem, and that environmentalists are just stirring up popular paranoia to line their pockets with contributions. James Howard Kunstler, by contrast, claims in *The Long Emergency* that oil prices are going to skyrocket, deadly plagues will sweep the land, the housing market bubble will burst, food and water will run out, and the human population will die off precipitously.

The International Energy Agency (IEA) says that annual oil consumption is going to rise by 50% between now and 2030, and that in the next 25 years the world will consume 1.5 trillion barrels of oil — as much oil as has been consumed over the last 100 years. Despite these mind-boggling projections, the IEA indicates

that there is nothing to worry about. They claim that there are an additional five to ten trillion barrels of technically recoverable oil in the ground. The IEA is fairly certain that modern technology will come to the rescue and produce cheap oil from the existing known oil reserves for the foreseeable future.

In his new book *Twilight in the Desert*, Matthew Simmons claims that the IEA's oil reserve estimates are all wrong. He points out the IEA based its data on figures provided by governments in the Middle East that are completely non-transparent and that haven't been independently audited since the 1970s. All OPEC governments have an incentive to exaggerate their reserves to get higher oil production quotas. The assumption

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## Letter from the Executive Director

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that energy prices will be stable for decades is based on the belief that Saudi Arabia can increase its daily production from around 10 million barrels a day to 20 or even 25 million barrels a day. Simmons, who looked into Saudi Arabia's oil production capacity, claims this is impossible,

Katrina has taught us that the worst case scenario is a real possibility. Governmental capacity to deal with natural disasters at home, let alone abroad, is fairly limited. Those too poor, too old, or too ill to build proper houses or own private motor vehicles are likely to be the victims of global warming and tightening fuel supplies. Even for families wealthy enough to own large



***Unprepared for the worst:*** As Hurricane Rita approaches the Texas coast, fleeing residents face gridlock on a Houston freeway

and that the Saudis are already at their daily production limit.

All of this ongoing debate shows that the future impacts of global warming and limited supplies of energy are extremely difficult to determine. Faced with uncertainty about potential disaster, most leading experts promote the 'precautionary principle' which states that it is better to avoid a given action if it is judged to have some potential for major or irreversible negative consequences. Fuel prices are likely to remain as unpredictable as the weather, and humanity's response to it even more unpredictable. But

sports utility vehicles, increasingly congested highways will likely become a less reliable means of escape when disaster strikes. Survival in the 21st century is a matter of preparing for the worst.

You don't need a weather man to know which way the wind blows. Burning 84 million barrels of oil a day, as the world currently does, cannot possibly be a good thing.

In most cities, well over half of commuting trips are made typically within cycling and walking distance. Too many cities still make it as easy as possible to take 4,000 pounds of vehicle weight with us to travel less than five miles, while making it virtually impossible to walk or bicycle these short distances safely.

We owe it to the victims of Katrina to end the

Photo: Mayra Beltran / Houston Chronicle. This photo may not be used for advertising purposes. This photo may not be resold.

# We owe it to the victims of Katrina to end the complacency about future energy security and global warming.

complacency about future energy security and global warming. Every city should make it possible for the majority of the population to walk and bicycle to their jobs safely and in comfort, and every city should make high-quality public transit one of its highest priorities. Every new major road should be reconstructed as a 'complete street' with bicycle lanes, sidewalks and preferential lanes for mass transit. To do anything else would be irresponsible, akin to ignoring the upkeep of the levees in New Orleans.

At ITDP we are not spending our time developing complicated models to tell us whether or not oil will run out or global warming will drown our cities. We accept that there is a risk, and believe the world needs to take precautions now.

ITDP promises to get a state of the art Bus Rapid Transit (BRT) system, a state of the art bicycle network, and a state of the art pedestrian zone built in every major region of the developing world within three years. ITDP promises to have 10,000 top quality, affordable bicycles sold in Africa through our California Bike program every year within three years. ITDP promises to have 500 modern cycle rickshaws on the road in Yogyakarta in three years. These are some of our benchmarks. We don't know if they will solve the energy crisis or global warming, but we know they will help insulate people from the risks of escalating energy prices and global warming, and show the way forward to simple, low cost solutions.

ITDP puts its resources where we find supportive partners among mayors and other key decision makers. Dar es Salaam is well on its way to having the first state of the art BRT system in Africa, and ITDP will not stop until Africa has a great BRT system. When it is built, we will bring leaders from all over the world to see and enjoy the system. ITDP is banking heavily on Guangzhou to have the first state of the art BRT system in China. We are banking on Ahmedabad to have the first state of the art BRT system in India. We are working with Sao Paulo to build its first bicycle network in the city center and on the periphery. Our hope is that mayors will try to outdo one another in bringing chaotic automobile growth in their cities under control and in

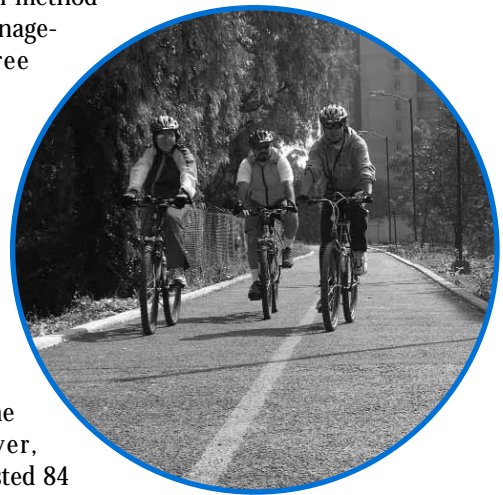
providing great public space, great mass transit, and great cycling facilities.

This year, ITDP, in conjunction with many other partners, will initiate the Sustainable Transport Award. Each year, we will give this award to the city making the most concrete progress towards reducing oil and auto dependence and improving the quality of life. Mayors who make the bold decisions to change the direction of their city's future deserve international recognition.

We have decided to retroactively give the first award to Bogotá, Colombia, for their amazing 300-kilometer of new bike lanes, the magnificent TransMilenio BRT system, the removal of one third of the on-street parking downtown, the implementation of the *pico y placa* license plate restriction method for traffic demand management, and its car free days.

This year, we will give the Sustainable Transport Award to Seoul, Korea. Seoul tore down a six kilometer-long elevated highway through the center of the city that obstructed access to the Cheongyecheon River, and they have short-listed 84 kilometers of additional elevated roads to be torn down. The new river-front park has 5 kilometers of new bicycle lanes, and is crossed by 22 bridges, five of which are exclusively for bicycling and walking. They also implemented 80 kilometers of a low-end BRT system with central median bus lanes, and plan to extend the system by 170 kilometers within a year. This has gotten the bus system's capacity up to 10,000 passengers per hour per direction at speeds of 20 kilometer per hour on many trunk corridors. While not perfect, it's a big improvement.

In the face of uncertainty, the world must reward these dramatic acts of precaution.▼





# 2005 ITDP Sustainable Transport Award Recipient: Seoul, Korea

Each year ITDP honors a city that makes significant progress in enhancing the “livability” of its communities by reducing transport emissions and accidents, increasing access for bicyclists and pedestrians, or improving the basic mobility of the poor.

The 2004 Sustainable Transport Award recipient was Bogotá, Colombia, for creating the TransMilenio Bus Rapid Transit system, city-wide bicycle networks, and improved public spaces under the leadership of former Mayor Enrique Peñalosa.

## Seoul: Leading by Example

By Karl Fjellstrom

Another interminable conference drones on, but the audience's reverie is suddenly broken. Disrupting the pious hypotheses and grand theoretical frameworks of the academics and experts, a speaker from Seoul takes the podium and talks about ‘political will’, ‘implementation’, ‘short term priorities’, ‘prioritizing buses’, ‘dismantling elevated roads’, ‘changing people's lives’ and ‘transforming the city in the term of one mayor’. This scenario is increasingly playing out across Asia. Seoul, just a few years ago seemingly spiraling into ever-worsening congestion, declining public transport and generally deteriorating city livability, has shown how with political will and imagination even a mega-city can be turned around in the course of a few years largely through transportation system and public space improvements.

The most spectacular symbol of Seoul's ongoing paradigm change from a car-oriented city to one favoring transit, walking, and cycling is the restoration of the Cheonggyecheon River.

In the 1960s, as Korea embarked upon its rapid modernization, Cheonggyecheon was entombed beneath a drab, cement elevated expressway through the heart of the city. The stunning success of the dismantling of this six-kilometer elevated highway, and its replacement with the original stream lined by high quality walkways and public spaces, holds many lessons for other cities about the true meaning of modernization. The grand



Workers apply some finishing touches prior to the grand opening in October 2005.

opening of the restored Cheonggyecheon took place on October 1, 2005, accompanied by the World Mayor's Forum 2005 and street festivals around each of the 22 bridges crossing the stream – five of which are exclusively for pedestrians and bicycles.

Seoul Mayor Myung-Bak Lee, elected in 2002, deserves much of the credit for Seoul's remarkable achievements in recent years. Earlier fears about traffic chaos and dire business impacts have not materialized. The two-year, \$350 million project of the Seoul Metropolitan Government included the complete demolition of the elevat-

ed highway in October 2003, and officials have already formulated a ‘short-list’ of 84 more elevated road sections in Seoul which could progressively be torn down. It is anticipated that three could be dismantled next year, and ten more in 2007.

Development along the river had been stunted for years due to the deadening impact of the noise, air pollution and congestion associated with the elevated highway. With the highway's removal, signs of revitalization are already emerging. The immediate vicinity has a population of 132,000 residents and around 10% of Seoul's

wholesale and retail companies. Locals and tourists alike can be seen admiring the new creation in their midst.

Seoul's 'revitalization and sustainability' (the catchphrase of the World Mayor's Forum meeting) extends beyond the Cheonggyecheon restoration, however. The canal in the photo below, for example, has recently had bicycle paths and walkways as well as seats and play areas built along its banks.

Of the other urban transportation system improvements in Seoul, however, the most striking is the five median busway corridors which became opera-



*Revitalization in Seoul has already commenced. This building previously faced an elevated highway, but now, facing a beautiful public space, has rediscovered an interest in windows.*

tional in July 2004. Seoul now has more than 80 kilometers of median bus lanes, and plans to have more than 170 kilometers within a year. Median busways provide on-street priority that has proved far superior to the 290 kilometers of curb-side bus lanes in Seoul. The government has also embarked on a far-reaching reform of the entire bus system. The Bus Operating System Reform implemented simultaneously with the median busways included a new busi-

*Seoul's revitalization includes areas like this canal, with newly built bicycle paths, walkways, and recreational areas along its banks.*

ness model (and effective quasi-nationalization) of bus operators, a new distance-based smart card system using Global Positioning System technology that covers public transport trips by both bus and metro; new bus technologies and transfer stations; and a new trunk-and-feeder oriented bus routing system.

Although the bus system reforms are not an unequivocal success, they are certainly a major improvement for the environment, bus users, and mixed traffic, placing Seoul with Jakarta, Indonesia at the forefront of bus system reform efforts in Asia. Issues confronting planners after a year of operation of the new system include:

- Large annual subsidies to the bus system, with operators paid per kilometer and indications that off-peak bus occupancy is often low, suggesting that the allocation of bus-kilometers in the new system is not tightly controlled.
- Pedestrian safety at the stations.
- Discontinuity of the busways, which means that although bus speeds within the busway are substantially improved, overall trip times and bus speeds, especially through the city centre, are still slow.
- Capacity constraints at the stations due to design limitations.



*Gangnam Road is the busiest busway corridor in Seoul.*

As in other median busway systems in cities like Kunming, Taipei, and Sao Paulo, stations have proved to be the bottleneck. Seoul has addressed this capacity constraint by limiting the number of buses in the corridors to a maximum of 250 buses per hour per direction. This translates to ridership of more than 10,000 passengers per hour per direction in peak conditions, at reasonable speeds approaching 20 kilometers per hour inside the busway. The capacity limitations, however, mean that some stations are overcrowded with waiting passengers, and that up to 40% or more of the bus demand in the main Gangnam corridor is served by buses which are not allowed into the busway.

Even with these limitations, however, it is impressive that the system

has the ability to move in excess of 10,000 passengers per hour per direction at speeds of nearly 20 kilometers per hour through corridors with at-grade pedestrian access to stations and four phase intersections — without pre-board fare collection, effective overtaking lanes or level boarding and alighting. ▽



# Tapping the Market for Quality Bicycles in

*Corporate executives previously dismissed Africa as a serious market, until the market for cell phones and other goods exploded. The California Bike and other higher quality, utilitarian bikes could be the next big thing.*

*By Aimée Gauthier and Walter Hook*

**M**ost people in Africa are written off as too poor to afford quality goods and services. The mobile phone industry there, however, has seen 1,000% growth in the past five years. Thousands of jobs have been created and many small local businesses have been established as a result of this growth. In the United Kingdom, it took 20 years for subscriptions to mobile phones to overtake fixed line services. In Tanzania, it took five years. In the process, people have also gained increased access to markets and information, allowing them to be more active participants in the economy. Nobody expected that mobile phones would achieve such success, in such a short time, in what many had believed was a poor market for basic consumer goods. ITDP's recent success in the California Bike project provides compelling evidence that the market for better quality bicycles in Africa is also ripe for private sector investment.

Four billion people in the world live on less than two dollars a day. In *The Fortune at the Bottom of the Pyramid*, C.K. Prahalad, a corporate strategy specialist, describes this four billion – 80% of the world's population – as the biggest untapped and underserved market in the world. They are aspiring consumers who could be the engine of the next round of global trade and prosperity. People at the bottom of the pyramid, contrary to popular belief, are conscious of value as they search for a better quality of life, but serving their needs requires new business models. ITDP's California Bike project has learned the first valuable lessons about workable models for this share of the market.





# Africa

## The California Bike Coalition

For years, NGOs were focused on trying to make affordable transport available to poor Africans through sending used bikes from the U.S., Europe and Japan and designing ultra-low cost, but ultimately not durable, bikes. Chinese and Indian bike traders focused on selling Africa the cheapest, lowest quality bicycles imaginable, usually old English roadsters or bottom-end one-speed mountain bikes. While this was an important first step in giving Africans more mobility, it also set limits to what choices were available and limits to what Africans could expect from bicycles. The few big name bicycle companies to enter the African market catered to tourists and racers, and these markets were very small. While new and used cars were pouring into Africa, nobody believed that there was a market for good quality higher status bicycles.

Working in Africa for over two decades, ITDP concluded that there was a huge potential market for good quality, middle-range bicycles, but nobody had ever tried to tap it. As average consumers are not bicycle experts, they rely on brand names to ensure higher quality. Because there were no trusted brand names in Africa, nobody was willing to pay more for a better bike. It was a “race to the bottom” in terms of the quality, and this undermined cycling as a legitimate form of transport. Earlier NGO efforts with used bikes, including our own, were not helping. As one Ghanaian told ITDP, “We’re tired of being the dumping ground for second hand bikes from Europe and the U.S.. When will good quality, new bikes start coming?”

In the absence of other transportation options, people in rural Africa need a robust, affordable bicycle that requires minimal maintenance. In urban areas, customers want a bicycle with some style and some gears, and they are ready to pay more to get it.

The lack of a trusted brand name

means there is a significant gap between the amount of money that people *currently* pay for a bicycle and the amount that they *would* pay if they believed the bike was reliable. By offering an affordable bicycle of reliable quality, ITDP

Ghana is buying  
more bicycles per capita  
than China.

believed that a market for a middle range bicycle could be created. ITDP created the California Bike in 2003 to test this market. ITDP’s technical team, working in partnership with bike manufacturers Trek and Sram, developed the six-speed “California Bike – Los Angeles” for this market niche. We then competitively bid the production, and the Giant factory in Shanghai won the tender because it had a reputation for high quality.

After only two years of operation, the California Bike has already proven that there is a market for a middle-range, good quality, utilitarian bicycle with good styling. Today, 2,213 California Bikes have been sold in Tanzania, South Africa, Ghana, and Senegal through 35 local independent bicycle retailers. Out of 1,920 bikes in the first six container shipment, there were only 2 minor manufacturing defects – an unprecedented level of quality. ITDP has recovered all of its \$144,000 initial invest-



*In many African cities, there is increasing demand for a more upscale bicycle that can be used for commuting.*

*continued on p. 10*

# Tapping the Market for Quality Bicycles in Africa

ment, and with the money recovered, ordered six more containers. This second shipment landed in June of 2005. Of the 1,790 bikes sold from the first shipment, ITDP realized a 16% rate of return on costs. The bikes are retailing from between \$80 and \$120 depending on tariffs and value added taxes, averaging around \$100. At this price, it is one of the most expensive bicycles widely available in sub-Saharan Africa outside of South Africa, but it costs *25% less than any bike available of equivalent quality*. For the first time, the African consumer has a brand name it can trust at a price it can afford.

Selling all these bikes in the African market was not easy,

through payroll deduction programs.

Many of the participating IBDs were fledgling small businesses, and many were not exclusively bicycle dealers. Most had no budget for marketing, no credit histories, and no capital to buy the bicycles up front. By joining the CBC, independent bicycle dealers were able to take California Bikes on consignment and credit at wholesale prices even when purchasing only a few bikes. They also received technical support on bike repair and maintenance, as well as sales training. In this way, the IBDs were able to access technical assistance and low-cost credit, while mitigating their financial risk of

taking on new products. Through this process, ITDP helped them develop credit histories that will become critical when asking for credit from banks and other suppliers.

Eventually, ITDP started channeling its direct sales to government agencies, donor agencies, and large employees through the IBDs. The IBDs soon became sufficiently entrepreneurial to seek out these sales on their own, and sales jumped significantly.

ITDP is now expanding the CBC project to introduce a one-speed bike for rural use, and to include spares and accessories to allow for product and services diversification within these businesses. Most of the profits in the bike business are not from the bike itself but from accessories, parts, and repairs, so the CBC is helping now with the procurement of spares and accessories. Now, bike retailers will be able to extend the life of a bicycle through better care and quality.

## The Potential of the sub-Saharan African Bike Market

World bicycle production doubled in the last 25 years, and today sales are over 100 million annually — more than twice the number of automobiles sold. Per unit sold, the bicycle industry is growing faster than the automobile industry. While the richest markets for future bike sales will still be the wealthy countries, the growth market in the 21st century will

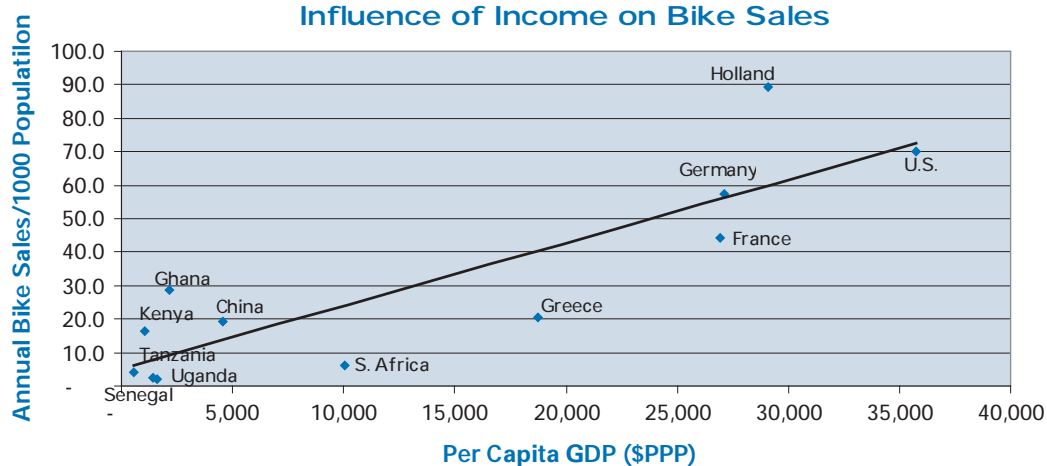
and required an innovative marketing approach. First, we had to enter the market with sufficient volume to reach the minimum production requirements of the factory and get a decent price. To do this, we had to consolidate demand from multiple sources.

ITDP identified independent bike dealers (IBDs) who were willing to become part of the newly formed California Bike Coalition (CBC) as local retailers. To get the demand numbers up, we consolidated their orders with sales to development organizations, government agencies, and private companies that were willing to sell bikes to their staff



**Above:** More than a third of the California Bikes sold in Africa were distributed through the Coalition's growing network of independent bicycle dealers, like Meshack Nchupetsang and Rufus Norexe in South Africa.

Photo: Louis de Waal





be in the developing world. The automobile industry has woken up to this, but the bike industry is only now making the same realization.

Bike sales are mainly a function of per capita income, though the level of bicycle use for both recreational and utilitarian cycling is the next most important factor. Countries above the trendline (bottom of page 10) tend to use bicycles for commuting and utilitarian use, while those below tend to use bicycles for recreation and sport.

Clearly, Holland is selling more bikes than the U.S. per capita, but the US is still a very robust bicycle market.

Despite the commonly held view that there is no culture for cycling in sub-Saharan Africa, much of Anglophone Africa (Kenya, Tanzania, Ghana) is buying more bikes than would be predicted based on their income levels. In fact, Ghana is buying more bicycles per capita than China.

While there is a clear relationship between income and bicycle sales, there is virtually no relationship between income and bicycle *mode share*. Even though bicycles account for only about 1% to 2% of commuting trips in most major Sub-Saharan African cities, bikes are heavily used for non-commuting trips in major cities, and in secondary cities bike use may be as high as 45% of all trips. The robust bike markets in some major African cities are for bikes that are being taken

to secondary cities, rural areas, and even to other countries.

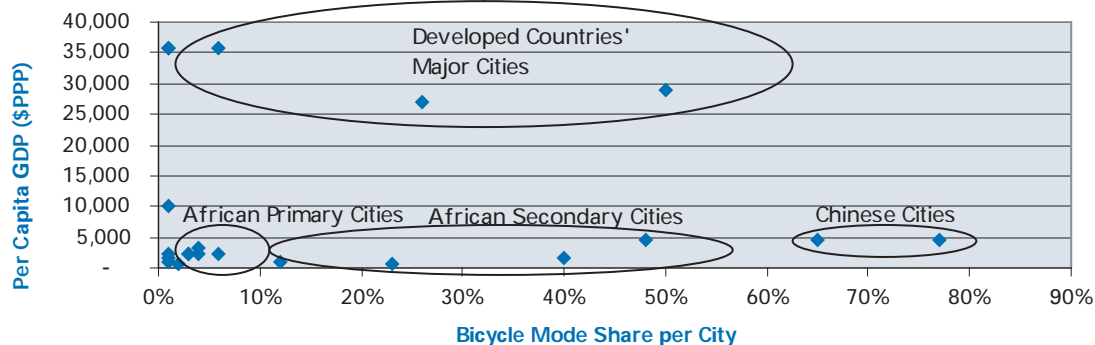
Tariffs are also clearly a major factor affecting bike sales in sub-Saharan Africa. When Kenya eliminated its tariffs on bicycle imports, annual bike sales per 1,000 people increased from 9.5 in 2001 to 16.4 in 2002. Ghana and Kenya, which have by far the highest bike sales and bike use in sub-Saharan Africa, both have reduced tariffs to near zero, while Senegal, Tanzania, and Uganda, which have much higher tariffs, have much lower sales figures.

The strategy for the California Bike Coalition in the next five years is therefore clear – target countries that are growing the fastest, have the highest existing bike use and sales, and have the lowest tariffs. The table below shows the richest sub-Saharan African countries and the growth rate over the last five years. With our base in South Africa, expansion into

Botswana, Namibia, Angola and Mozambique would be possible. From our base in Senegal, expansion into Burkina Faso and Mali should be pursued.

Based on ITDP's analysis, average annual sales of 20 bikes per 1,000 population is a reachable target for sub-Saharan Africa by 2020. Ghana is already at this target, and Kenya is near the target. If the quality of the bikes also

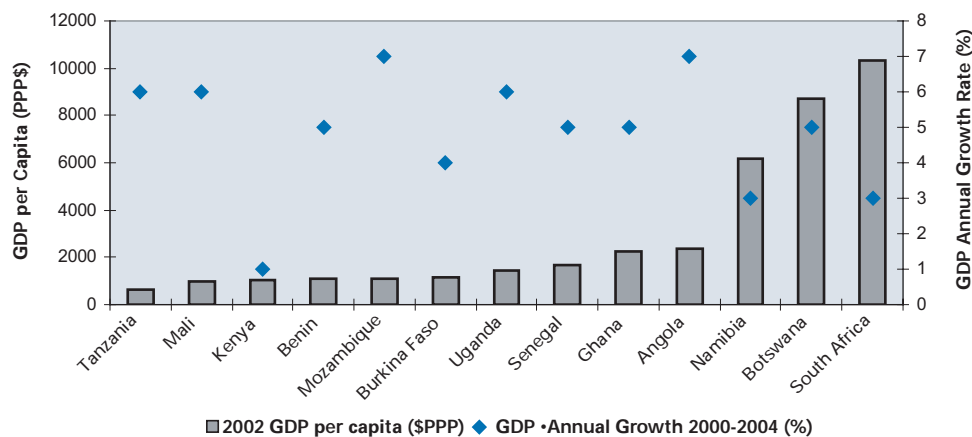
Relationship of Bike Mode Share to Per Capita Income



Bicycle Consumption Per Thousand Population

|                                       | GDP per capita in PPP\$ 2002 (UNDP) | # of Bicycles Consumed | Population (in millions) | Bicycles per Thousand |
|---------------------------------------|-------------------------------------|------------------------|--------------------------|-----------------------|
| Senegal                               | 1,580                               | 20,253                 | 9.9                      | 2.0                   |
| Uganda                                | 1,390                               | 60,675                 | 25.0                     | 2.4                   |
| Tanzania                              | 580                                 | 143,738                | 36.3                     | 4.0                   |
| South Africa                          | 10,070                              | 276,122                | 44.8                     | 6.2                   |
| Kenya                                 | 1,020                               | 517,302                | 31.5                     | 16.4                  |
| Ghana                                 | 2,130                               | 588,048                | 20.5                     | 28.7                  |
| Total/Average of Tier I CBC Countries | 2,795                               | 1,606,138              | 168.0                    | 9.6                   |

Economic Performance - Select African Countries



continued on p. 30



# BRT Poised for Take-Off in China

*In more than a dozen Chinese cities, efforts are underway to develop Bus Rapid Transit systems as a competitive travel option.*

*By Karl Fjellstrom*

**C**hina in 2005 is the scene of the most frenetic Bus Rapid Transit development in the world today, and possibly in history. Consultants, manufacturers, vendors, promoters, detractors, financiers, and others on the rapidly accelerating BRT bandwagon are converging on the Middle Kingdom. Plans for Bus Rapid Transit are now being elaborated in a dozen major cities. A system is already in operation in Beijing, and Hangzhou's BRT commenced construction in September. A Construction Ministry decree and ongoing promotional efforts by the Energy Foundation and others have played an important role in this rapid expansion.

Following are some of the key developments.

## Beijing

The Beijing BRT, with technical support from the Beijing Energy Foundation, was launched in December 2004 as a 'test' BRT corridor. It was the first 'closed' (stations requiring fare collection before boarding) BRT system in China and only the second outside Latin America after Indonesia's TransJakarta Busway. The first line was a 5.5-kilometer segment of the first 16-kilometer corridor, from Qianmen in the city centre southward. A fleet of 15 articulated CNG buses, more than \$300,000 each, is being operated by the Beijing Bus Company.

*Photo: The Qianmen station on the Beijing BRT, at the northern end of the first corridor in the heart of the city.*



The system has fallen somewhat short of expectations. The system's planners forecast a 2005 ridership of 6,000 to 8,000 passengers per hour per direction. The actual ridership is around 1,000 to 1,500 passengers per day, in both directions. The peak service frequency is around four buses per hour and the off-peak frequency is two buses per hour. Along the route, there are typically only a few passenger boardings per trip, with most stations having neither boarding nor alight-

**ITDP has been working with the City of Guangzhou to develop a detailed conceptual plan for BRT and evaluate various corridor alternatives.**

ing passengers. Consequently, only a few of the fleet's buses are actually in operation. The rest of the BRT buses cannot be used elsewhere in the city because they only have doors on the left side to serve median bus stations.

The buses have single-person seats as well as, puzzlingly, double seats with a capacity of around 1.5 persons instead of two persons. In addition, there are several seat-less compartments inside in the front section of the bus to accommodate the low-floor design of the bus. Consequently, although the buses are 18.5 meters long, their capacity is not significantly higher than the capacity of a regular 12-meter bus.

The only part of the corridor that has any meaningful passenger demand or congestion, namely the first two kilometers from Qianmen to Tiantan, has neither exclusive bus lanes nor a single BRT station.

The station design makes only a token effort to exclude passers-by from entering the closed system without paying, and BRT lane widths of 4.5 to 5.5 meters have been provided — too wide for one bus but not wide enough for a passing lane.

On the positive side, though, the system is equipped with all of the latest Intelligent Transportation System (ITS) features as well as a Global Positioning System (GPS) on each bus and advanced passenger information systems. The lack of passengers has meant that potential problems with the surface of the BRT runway and the capacity of the station design to accom-

modate large volumes of passengers have not materialized.

The Beijing BRT has been deemed to have 'passed' the test phase, and the remaining 11 kilometers of the first corridor is currently under construction. The cost of the first corridor is estimated by system planners to be US\$4 million per kilometer, though this apparently includes associated roadway infrastructure in the same corridor.

### Hangzhou

Hangzhou will open the first ten kilometers of its 28-kilometer east – west BRT line after construction is completed in April 2006. Construction of the first of six planned transfer terminals started in September. Station design concepts were earlier announced to the public so that people could vote for their favored option. The city's monopoly state-owned bus operator



*Hangzhou's BRT corridor, to commence operation later this year, features impressive bicycle and pedestrian facilities*

has taken a leading role in the planning, and in the procurement of a fleet of 18-meter articulated, semi-low floor BRT buses (which accounts for around 40% of the project budget). It has not yet been decided whether the system will be 'open' or 'closed', though stations will be 60

*continued on p. 14*

## BRT Poised for Take-Off in China

meters long with pre-board fare collection and level boarding and alighting. The second and third BRT lines have already been defined. The first BRT corridor will be adjacent to a new curbside bicycle lane serving tens of thousands of cyclists each day and reaching into the heart of the city. Highlights of the exemplary bicycle



*Guangzhou's Zhongshan Avenue is one option considered in a detailed BRT conceptual plan completed by the Traffic Improvement Leading Group Office, the Guangzhou Municipal Technology Development Corporation and ITDP.*

facilities in the BRT corridor include a grade-separated, fully segregated bikeway through a multi-level intersection and a cavernous underground bicycle parking area in front of the city's fanciest shopping mall.

### Guangzhou

Guangzhou has not yet made a formal decision to implement a BRT system, but ITDP has a memorandum of understanding with the City Construction Commission and has been working with the city to develop a detailed conceptual plan and evaluate various corridor alternatives. Demand analysis shows that the peak passenger demand on an 18-kilometer Guangzhou BRT system in Zhongshan Avenue would approach 20,000 passengers per hour in the peak direction. This exceeds the passenger ridership in any other

BRT system being considered in China and even the daily passenger ridership of the city's two 18-kilometer metro lines. As a result, if Guangzhou proceeds with the BRT system, it is expected to be an important example for other cities in China and regionally. A decision is expected later this year.

### Xi'an

Xi'an's metro has been approved by the central government, on a north-south alignment along the only corridor in the city where public transport passenger demand significantly exceeds 5,000 passengers per hour per direction. BRT has also been approved, in an east-west alignment. Xi'an will probably need to consider some kind of open BRT system, firstly given the constricted space available through the historic city centre, and secondly for the fact that the public transport demand in the city is fairly dispersed rather than concentrated on a few high volume corridors. A detailed survey program is currently being undertaken to assess passenger demand and plan the system.

### Chengdu

BRT is being planned on the 28-kilometer second ring road in Chengdu. This proposed system, which would feature 30 stations, was designed by mid-2004 but has yet to enter an implementation phase. BRT lines were also being considered on one east-west corridor and on the main north-south corridor of the city, but these options now seem unlikely for the first phase. Several leaders from the city government, including a deputy mayor and the head of the Construction Commission, visited the Beijing BRT a few days after the system opened in December 2004 and shortly before the implementation of the Chengdu BRT was due to commence. Since then, the implementation of BRT in Chengdu has been delayed while officials re-assess the design and planning options.

### Jinan

Jinan is currently carrying out the detailed planning for a BRT system to be built simultaneously with an elevated road, on a very wide, relatively uncongested, moderate to low demand corridor north of the city centre. Earlier proposals for an elevated BRT have been changed, and the design of the elevated expressway has been changed to accommodate BRT stations between the pylons in the centre of the road, rather than having a single central pylon as previously planned. The design is currently being finalized



and Logit Consultiva of Brazil is providing planning assistance to try to ensure that flexible buses (buses with doors on both sides to allow operation inside and outside of the BRT infrastructure) are used, and that the BRT system also accesses the city centre where most of the demand is concentrated.

### Shenzhen

Shenzhen has expressed interest in BRT, though the first line of a planned 200-kilometer subway network for 2010 opened last December and two other metro lines are currently under construction. Given the elongated layout of the city, this means that the major corridors of public transport demand in the city will be allocated to metro, leaving at best some medium capacity or local feeder routes for BRT.

### Chongqing

Chongqing has also developed preliminary plans for BRT. The first BRT corridor, 24 kilometers from the city centre to the west, was announced in late 2004, but as with Chengdu the commencement of implementation appears to have been delayed.

### Wuhan

Together with the World Bank, ITDP recently organized a visit of the Mayor of Wuhan to Bogotá to see what is widely acknowledged to be the world's best BRT system, TransMilenio. The state-owned Wuhan New Area Construction and Development Investment Company has developed BRT planning in several key corridors in the city, citing the relatively low investment cost, rapid implementation time, and possibilities for integration with the metro and a newly implemented Light Rail Transit line. The first median-aligned BRT corridor is planned to be 14 kilometers long and traverses Meizi Road which has an impressive peak public transport passenger demand approaching 15,000 passengers per hour per direction.

### Kunming

Kunming was a median busway pioneer in China and Asia with the first corridors implemented in 1999. The system has operated well, accommodating high volumes of bicycles, buses and pedestrians. By 2005, however, it has become evident that the configuration of ten-meter buses, single lanes at stations, four-phase intersections and stations located at intersections was encountering serious capacity constraints, resulting in unreliable travel times and

long bus queues at stations. Kunming is now planning to upgrade the median busway by addressing the capacity bottlenecks associated with the stations, vehicles, intersections and fare collection system. Although intersections along the busways have recently been changed to two-phase operation (with waiting areas in the intersections provided for left-turning bicycles, and buses allowed to turn left when there is a gap in traffic or at the end of the phase), and the new corridor locations have been identified, other aspects of the upgraded system are still in the preliminary design stages.

### Nanjing

Nanjing is engaged in preliminary BRT planning led by the Urban Transportation Planning and Research Institute and currently favors building BRT in new urban districts that connect to the city centre, rather than within it, due to right of way limitations. A timetable for implementation has not yet been announced.

### Shanghai

Shanghai has been planning BRT in various forms and locations – including an elevated ring expressway, Pudong, new satellite towns, and the site of the World Expo 2010 – for at least two years, but differences between various bureaus have meant that final plans have not yet been approved. Shanghai has, however, taken action to attempt to promote public transport and will this year implement 60 kilometers of curbside bus lanes.

### Fuzhou

The Fuzhou Public Security Bureau in May announced a preliminary BRT concept for a 4.5-kilometer corridor connecting the east and west section of the second ring road, through the congested city centre, with 65-meter long median bus stations. These plans have not yet been approved by the city government, and the city is currently considering including BRT in a World Bank loan project.

### Other cities

Other Chinese cities involved in various kinds of preliminary BRT planning include Shenyang and Tienjing. Several cities have implemented bus priority measures, including median-aligned bus lanes. Shijiazhuang last year implemented exclusive median bus lanes on one road in the city centre. The system is operating successfully but there are currently no plans to extend the median busways.v

# Pedestrianization in Yogyakarta: Transforming the Malioboro One Step at a Time

*This article was taken from a report by Cholis Aunurrohman, an employee of Intrans, a non-governmental organization under contract to ITDP in Indonesia, under the auspices of the US AID Livable Communities Initiative.*

by Walter Hook

Over the past three years, ITDP has been working with the Municipality of Yogyakarta to help pedestrianize Malioboro Road. Yogyakarta, Indonesia, is the center of Javanese culture, and Malioboro Road is an ancient street that traditionally served as the ceremonial access road to the Sultan's Palace (Kraton), connecting Mount Merapi and Parangtritis. For decades it has been an important commercial street, and many of Yogyakarta's most important markets are clustered around it. Yogyakarta also earns a large share of its income from tourism, and Malioboro Road is an important tourist destination.

While some real progress has been made, the difficulties encountered provide some clues as to how these projects might be implemented elsewhere. The problem with pedestrianizing major commercial streets in developing countries is not technical, but political. Public space, like any other public good, tends to be taken over by private interests, usually by interests with political connections. Negotiating a change in these relations ultimately

requires intimate local knowledge and strong political leadership.

Yogyakarta is a city dominated by university students, and as the students have become wealthier, most of them have bought motorcycles. Some 6,000 motorcycles are sold each month in Yogyakarta, and motorcycles make up

and most of them carry few passengers. Bicycles and becaks (traditional cycle rickshaws), survive, but they are also rapidly being replaced. Unlike elsewhere in Indonesia where becaks have been replaced by administrative decree, in Yogyakarta they are supported by the Sultan. Still, they have not been able to maintain market share against motorcycles.

With the streets full of noisy, polluting, and fast-moving motorcycles, the character of street life along Malioboro has fundamentally changed. Many people would like to take becaks and bicycles, which don't make pollution or noise, but they just don't feel safe or comfortable.

As motorcycles have taken over the transportation system, Malioboro Road roars with traffic and air pollution. Much of the public space is occupied by motorcycle parking. As



*Noisy, polluting motorcycles make up 80% of Yogyakarta's vehicle fleet and have largely displaced other forms of travel.*

80% of the city's vehicle fleet of 260,000.

This growing motorcycle fleet has largely displaced other forms of travel. The bus system operates only 591 buses

a city center, it should be able to carry 70,000 pedestrians per hour, but it is currently only able to handle 25,000 pedestrians per hour on its crowded sidewalks.



Since the master plan of 1995, Malioboro Road has been identified as a priority area for revitalization. Unlike other parts of Indonesia, the Sultan of Yogyakarta, a hereditary monarch, also serves as the Governor for life, and the Sultan has expressed interest in seeing Malioboro Road used for more cultural functions and tourism.

Starting in the late 1990s, with help from the Swiss Development Agency and Electrowatt, a consulting firm, Yogyakarta developed a plan to pedes-

some people enjoyed it, while motorcyclists and street peddlers complained. Among the shopkeepers, maybe half supported the measure, and half were opposed.

Under the plan developed by Electrowatt and the Provincial Government, most of the \$10 million would go to water, drainage, and other unrecoverable costs, while the private sector was expected to pay for the parking garages. Unfortunately, through the end of 2004, no investors have been

of the becak; and outreach to the various interest groups to move the pedestrian zone forward politically. ITDP has worked in close cooperation with both Intrans and Gadjah Mada University's Center for Transportation Studies (PUSTRAL).

With ITDP cooperation and support, PUSTRAL developed a plan to change the street structure around Malioboro road. ITDP sent several traffic experts to work with PUSTRAL on the traffic impact study. Their studies showed that



trianize Malioboro Road and make many other changes to revitalize the area. In 2000, the Sultan and the Mayor of Yogyakarta issued a mandate to further develop the project in an attempt to secure funding from the Japanese Bank for International Cooperation (JBIC).

As a test, Yogyakarta closed Malioboro Road from 3 p.m. to 9 p.m. every Saturday and Sunday for one month. Saturday and Sunday have the peak traffic volumes on Malioboro, with about 6,000 vehicles per hour, or 3,000 per lane. The closing was announced through the mass media. An exception was made for hotel guests and delivery vehicles. The trial closing had mixed results. No formal assessment of public attitudes was conducted, but the general perception was that

*Left: Raised crossings allow pedestrians to navigate Malioboro more safely.*

*Right: Access road to Malioboro under reconstruction with partial pedestrianization.*

interested in building the parking garages, as they have to compete with on-street parking, which the government has refused to remove.

When the trial closing met with mixed public reaction, and the project was not short-listed to be financed by JBIC, the project lost momentum. At this point, ITDP became involved with support from US AID through the Livable Communities Initiative, and with support from the Toyota Foundation. [see becak article box inset]

ITDP decided to work in the following three areas: analysis of the traffic impact of the closing and preparing a traffic mitigation plan; modernization

70% of the people driving down Malioboro Road were just passing through the area, and about 30% were planning to shop in the area. The idea was to initially divert the through-traffic.

In the summer of 2005, the street structure along Malioboro was rerouted. This cut the traffic on Malioboro Road by about 30%. They also built several raised pedestrian crossings to help make it possible for pedestrians to reach the area safely.

ITDP also sent world-famous urban designer Jan Gehl from Copenhagen to meet with the Mayor and municipal

*continued on p. 18*

## Transforming the Malioboro

authorities, and explain to them how Copenhagen and other cities pedestrianized large parts of their city centers, and the impact it had.

Intrans then began a dialog with the numerous interest groups controlling Malioboro road. We had been warned by Electrowatt's consultants that the real problem lay in the opposition from

attendants and the groups that control them are clearly the most powerful and profitable. In addition, the structure of the parking industry turned out to be much more complex than anyone had imagined. At the bottom of the hierarchy, there are 118 people who earn their living as on-street parking attendants in the Malioboro area. Most of

Usually, he receives money from the boss of up to eight dollars a day.

Above the land owners are the area leaders. They work invisibly and are usually active members of the police and military service. They are very close with the thugs and have the ability to organize them. Every month they receive money from the land owners.



*Intrans has started a dialogue with parking, street vendor and becak groups on Malioboro Road to address their concerns without sacrificing the broader public benefits of pedestrianization.*

groups representing parking, becak, and street vendor interests. Intrans began a dialog with these various interest groups, to see whether or not a plan could be developed that incorporated their concerns without sacrificing the public interest.

This analysis showed that at least 13 groups were profiting from the appropriation of public space along Malioboro Road. These groups include all strata of society. Six were vendors associations that controlled specific localities. Several were becak unions. Several others were organized societies of street children who make a few pennies helping the vendors with minor tasks. One or two were legal chambers of commerce. The rest are basically protection rackets and criminal gangs, mostly controlling the parking, with connections all the way up to senior government figures who earn a few dollars by pretending not to notice the expropriation of public space by private interests.

Among those groups, the parking

them are between the ages of 15 and 40, and many of them are supporting families. They bring home about two dollars a day, which is below the median income in Indonesia. They give the driver a parking voucher, which they get from a boss. They skim a little profit by using the same tickets several times. Above them there is a boss who employs roughly eight parking attendants, usually with two working shifts per day. The bosses make about eight to ten dollars a day. The boss is usually a member of a political party and has a wide mass network. He uses the party connections to pay people off so that their parking slots are not threatened.

Above these bosses, there are land owners. They are often called "white collar parking attendants". The land owner is not on site everyday but always receives the money. He is also frequently a thug with a strong mass network and can move the people at any time. It seems that he has some protection from the police and military personnel.

From one place they can receive around two dollars per day per location.

Because the police are responsible for enforcement and currently benefit from the informal parking structure, it is no great wonder that reforming this system has proven to be difficult, and why the multitude of well-intentioned studies and designs are never implemented.

Dealing with these parking interests has proven to be the main obstacle to project implementation. The city administration has plans to relocate the parking attendants into underground parking areas planned as part of the redevelopment of the Malioboro area and pedestrian zone. There are also at least nine parking lots provided, such as in the former Public Works building.

Without the money from JBIC, the Mayor has been trying to demonstrate to the parking interests, step by step, that the city is going ahead with the pedestrianization in an attempt to force them to the bargaining table. They propose to first pedestrianize the southern-



most part of Malioboro road in front of the Kraton or palace. This area has very little commercial traffic, and is not ideal for pedestrianization, but as a result it is politically easier, and the Mayor wants to do this piece first as a show of political resolve.

In May 2005, the Mayor signed a memorandum of understanding with PT Duta Anggada Realty to construct an underground parking lot and shop-

ping mall at the southern end and along Malioboro Road, pedestrianizing the surface. With a capacity of 2,000 motorcycle units, this parking lot is estimated to generate enough profits to re-employ the 118 parking attendants that would be displaced from Malioboro, to turn them into legal employees, and to increase their salaries five times. The economic feasibility studies show that the parking facility

could be highly profitable.

However, the parking attendants do not support the plan. On August 20, 2005, they organized a demonstration against it. Perhaps they were put up to it by their bosses, perhaps they were misinformed, or perhaps they legitimately do not trust the company to actually include them in the new facility. At this point we don't know.▼

## Update: Becak Modernization in Yogyakarta

by John Ernst

With the support of the Toyota Foundation, ITDP has been working with our partners in Yogyakarta to develop a modernized becak. The becak is a non-motorized, three-wheeled rickshaw and is unique in having the passengers sit in front of the driver.

Based on ITDP's successful modernization of the rickshaw in India, the becak modernization project aims to revitalize the becak as a mode of transportation. The purpose is to increase the becak's safety, comfort, and status, while reducing the weight for the drivers. In addition to providing pollution-free transportation, the project also directly benefits the poor – increasing the earning power of drivers who are often in the lowest income groups.

ITDP has received strong support from other organizations. The Yogyakarta Tourism Department has directly ordered 50 of the modernized becas to serve as special tourist vehicles. A Muslim charity organization has also purchased modernized becas in their efforts to help the poor. Local becak manufacturers and the tourism industry have offered their support and cooperation.

During 2005, the modernized becak model was further



**Above:** The modernized becak  
**Right:** Two young Yogyakarta residents take a ride in the modernized becak.

refined and updated to address the suggestions of the drivers and passengers who used the 2004 model, the Bisma. The current model is now undergoing initial production. Efforts are now focused on marketing the current model to reach a wider audience.

As part of the project, a special workshop has been constructed to serve as a laboratory for development and production of the initial models. The workshop also serves as local headquarters for Instran. Under Instran's management, the project utilizes local workers with the guidance of local design assistant, Mr. Jufri Tengga, an engineering student at Yoga's Gadjah Mada University. Technical direction is provided by Ms. Shreya Gadepalli of India, while oversight and guidance is provided by ITDP Vice President, Mr. Matteo Martignoni. Matteo and Shreya bring to Yogyakarta their experience from the development of the design for the Indian modernized rickshaw.

ITDP will provide modernized becas to transport participants in the Better Air Quality conference to be held by the Clean Air Initiative for Asia in Yogyakarta during September, 2006.▼



# More Than Just Roads and Trucks:

# Scaling Up for

# Healthcare Mobility

# In Africa

*What will it take to reach the Millennium Development Goals by 2015?  
Addressing healthcare mobility needs requires more than just vehicles and roads.  
ITDP's pilot projects in Ghana and Senegal are finding the answers.*

*By Aimée Gauthier*

**I**n 2004, Jeffrey Sachs' Millennium Project challenged ITDP to figure out what it would take to reach the health care targets in the Millennium Development Goals established by the United Nations. He suspected that better transportation was critical to the goals of reducing maternal mortality by 75% by 2015, and halting the spread and reducing the incidence of HIV/AIDs, malaria, and other major diseases. He wanted to know how many trucks, ambulances, and kilometers of paved roads it would take to meet the target. If there were unlimited resources, how much would it take, and what would need to be done? Would trucks, ambulances, and roads be enough?



*Bicycle ambulances improve pregnant women's access to health centers*

ITDP knew that without functioning vehicles, roads alone would do little. We knew that bikes could play a critical role in addressing Africa's health care crisis, and we had a lot of incidental evidence to prove it, but we also knew they were only part of the answer. We knew from Riders for Health that the UN alone spends \$200 million every year on new vehicles, and that if just one year's budget were spent on setting up proper maintenance facilities perhaps \$400 million could be saved over the next two years and \$130 million or so every year thereafter. Challenged by the Millennium Project, we decided to figure out what it would take to solve the logistics needs of health care delivery services. We found that the solution lies in establishing a system for procuring and main-

taining an appropriate mix of vehicles and telecommunications.

ITDP began by sending Jürgen Heyen-Perschon, the Director of ITDP's sister organization, ITDP Europe, to Ghana and Senegal to help us develop a scalable project that would systematically deal with the health care logistics needs. Jürgen had spent years in Uganda working on rural transport projects for German Technical Assistance (GTZ). We asked Jürgen to find a solution to the health care mobility problem without assuming that bikes were necessarily part of the solution.

After negotiations with the Ministry of Health in both Senegal and Ghana, Jürgen decided to focus on assessing the mobility needs of service delivery at the district level while understanding the health system as a whole. In Senegal, he started in Dakar with the Ministry of Health,



*Jürgen with healthworker and patients at a health point in Ghana.*

then worked his way down to the Kaffrine District in Kaolack Province and the Linguerre District in Louga Province. Both were remote rural districts with very high levels of maternal mortality and incidence of malaria and other diseases. In Ghana he worked his way down to two remote rural districts in the sparsely populated Northern Region.

Both countries had a similar structure (see table below).

In Ghana, a comprehensive transport policy was in place that specified the sort of vehicles that were supposed to be available for each level of the health care service delivery system (see table), as well as maintenance and repair regimes. For example, the Ghana Health Services (GHS) had developed a Zero-Breakdown-Modular-Maintenance-System (ZBMMS) for motorcycles in health care. We had heard that this system had been used in some areas to great effect, increasing the working life of the vehicles from three to five years. At the regional level, transport managers were responsible for the vehicle fleet and implementing this transport policy. However, at the district level and below, there were no specific personnel responsible for the vehicle fleet.

When Jürgen visited the pilot communities, however, he

In Senegal, the policy framework was determined more at the local level. The Ministry of Health decides on the budget for vehicles in negotiation with health officials in the Regional Capital. There is a health committee that makes decisions on which vehicles and maintenance are needed. There are no personnel with specific responsibility for looking after the vehicle fleet, which at the regional level is just

| Level        | Type   | Typical Staffing                          |
|--------------|--|---|
| 1) Region    | Regional Hospital  | Varies                                    |
| 1) Districts | District Hospital (Ghana)<br>Centre de Santé (Senegal)         | 1 or 2 doctors<br>15 to 20 staff          |
| 2) Villages  | Sub-District Health Center (Ghana)<br>Poste de Santé (Senegal) | 4 to 5 health workers<br>no doctor        |
| 3) Community | Health Point (Ghana)<br>Case de Santé (Senegal)                | 1 to 2 health agents<br>perhaps a midwife |

one of several responsibilities of the regional health administrator. Problems with broken down vehicles were widespread. At the district clinic in Linguerre, for example, only one out of nine ambulances was functional.

Not sure whether these observations were specific to the districts he visited, Jürgen then conducted interviews with various health care NGOs. Most of them felt four-wheel drive all terrain vehicles fared best, but were very expensive. The Red Cross, the World Bank, UNICEF, and the Society of Women Against AIDS had all donated motorcycles to district or sub-district level health clinics. However, due to the difficult road conditions, the motorcycles were unusable unless they were all-terrain motor bikes. Without proper maintenance and access to spares, they broke down after two to three years. A recent Danish Red Cross effort with normal bicycles is working better

| National Policy for the Transport Portfolio in Ghana<br>(the minimum mix of vehicles required at each level) |  |                            |                            |
|--|--|----------------------------|----------------------------|
| Regional Hospital  | District Hospital  | Health Center              | Health Points              |
| 1 Saloon Car<br>1 Ambulance<br>1 Minibus<br>2 Pick Up<br>5 Motorcycles<br>1 Bicycle                          | 1 Ambulance<br>1 Minibus<br>2 Pick Up<br>1 Motorcycle<br>1 Bicycle | 2 Motorcycles<br>1 Bicycle | 1 Motorcycle<br>5 Bicycles |

found that, in addition to not always being implemented, these guidelines were not as effective in actual practice.

For example:

- There was no second pickup truck ambulance in the Saboba District.
- There was no minibus in the Savalegu District.
- None of the motorcycles belonging to a Saboba sub-district health center were working, save one vehicle owned by the nurse.
- Motorcycles were eight years old or older, breaking down frequently.
- Bicycles were not accessible at the community level or were in need of repair.
- The aging vehicle fleet (average age of a motorized vehicle in 2000 was 7.7 years) has resulted in increasing fuel consumption and repair/maintenance costs.

ter where the soil is not too sandy, and horse carts where the soil is sandy, but the evaluation has not yet been completed.

Finally, at the health points, the most local level, almost no vehicles were available. These local health points are the first point of contact for many people with the health care system. Health agents at these local health points are charged with health outreach and prevention, including vaccination campaigns, and they have to make decisions about when to refer patients to sub district or district clinics for help, and how to get them there. Almost all health agents working at the health points, as well as the community health volunteers (CHV), have no access to their own means of transport and generally rely on walking. In addition, motivation is low due to the fact that almost all health agents at this level are working without any salary. In the Saboba District in Ghana, only 33 out of 480 (7%) CHVs have a bike and according to

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# Scaling Up for Healthcare Mobility in Africa

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the transport policy, a bicycle is expected to help them do their daily work.

Ultimately what this illustrated is that providing vehicles alone, while necessary, is not sufficient to solve the problem.

All the health workers we interviewed stressed the importance of telecommunications in improving the efficiency of the scarce transportation resources. If a patient turns up at a health point, the local health worker may not be qualified to diagnose the illness or determine its severity. They need advice from a doctor or nurse about how to treat the patient or whether to send the patient to the nearest clinic or hospital. They also then need some way of getting the patient to this care. The current status of this referral system and related logistics challenges have led to the death of many mothers in childbirth.

However, providing communications equipment is also not sufficient. The Health Directorate's communications equipment in Saboba was broken and not being used. Furthermore, differences in the compatibility of communication equipment at the district and regional levels make it hard to communicate between health centers.



Based on this analysis, Jürgen came to the following conclusions:

- Vehicle breakdown was sometimes the result of having vehicles with an inappropriate technical specification for the rugged terrain.
- Frequently, spare parts and maintenance costs were not budgeted or planned for.
- Many times, there was no personnel with the necessary skills responsible for maintaining or repairing the vehicles.
- There were insufficient funds to buy new vehicles to replace old vehicles.
- Telecommunications play a critical, frequently overlooked role in improving the efficient use of a scarce vehicle fleet and improving the referral system.

A different vehicle and telecommunications mix might yield better results. For example, a single motorcycle ambulance costs as much as 16 donkey and cart ambulances, or 35 bicycle ambulances. Once the motorcycle ambulance is broken, it is worthless. A two-way radio system can be purchased for the cost of a motorcycle or 12 mobile phones with one year's worth of credit. Getting the right mix of vehicles and telecommunications was difficult, location specific, and required testing.

The Program for Appropriate Technology in Health, working in the Matam Region in Senegal on an immunization program, introduced transport management, which trained drivers in safety and preventive maintenance, but the program had only mixed results. Riders for Health, working in other countries, had some success with establishing motorcycle maintenance regimes, but these programs were not active in Ghana or Senegal.

Maintenance programs cannot be imposed upon a health center if there is no capacity to use them, and are only effective if mindful of the context in which they are being managed.

## ITDP's Pilot Project for a Health Care Mobility System

ITDP set up pilot projects in each of the districts we studied to systematically address the mobility and communications needs in a way that would give us a rough idea of what it would take to bring such interventions to scale. We decided to focus on strengthening the health point and the sub-district health

**top:** In Senegal, only one out of every eight ambulances is in working condition

**left:** Children's death rate is high, although most illnesses are preventable by improved access to health care.



center by first increasing the health center's ability to supervise the health point through communications equipment, then by strengthening patient referral with ambulances between the health point and the health center.

We concurred with earlier assessments that some motorcycle ambulances are needed. Lacking experience and funds to include these in our pilot project, ITDP is seeking partnerships and/or additional funding for this component. However, we decided to increase the allocation of bicycles to the local health points as a more cost effective approach than using more motorcycles with fewer people (for every one motorcycle purchased, you could buy 30 bicycles). We changed the technical specification on the bicycle also, using ITDP's California Bike, a six-speed mountain bike with wide tires to help in sandy and muddy conditions, as the most appropriate and cost-effective of the available options. The California Bike was designed to be stronger, more durable, and easy to maintain in difficult environments. We also reasoned that giving the bicycles to the local health point workers would boost morale, compensate them for their volunteer work, and help them in their work on vaccination and prevention of disease.

ITDP decided that part of the pilot project would be a community-based, non-motorized ambulance (bicycle or animal-drawn cart) for the transport of patients to the health point. Non-motorized ambulances are cheaper to purchase and maintain. Fuel concerns are less of an issue and replacement parts should be readily available in the rural areas. ITDP recommended the use of a donkey and cart in Ghana instead of a bicycle ambulance, despite the high level of use of bicycles in the Northern Region, for two reasons – the muddy conditions created by the rainy season, and the ability to carry more than one person in the cart. In Senegal, the proposal for using animal-cart ambulances met with local resistance, with some feeling it was undignified, and is still being discussed.

To strengthen supervisory capacity within the districts, communications equipment was deemed a better, more cost-effective investment than simply adding more vehicles.

Facilitating communication can greatly reduce administrative travel needs by allowing health points to contact supply centers before they travel to verify that the supplies are there. It also allows them to ask questions and solve problems remotely with the help of supervisors.

In Senegal, we decided to go with mobile phones, as the technology has spread rapidly even to fairly remote areas, and with a radio communication system in Ghana.

Communication technology is an integral part of this project. Regular maintenance, training of radio operators and well-kept logbooks were judged as key success factors of the project and in evaluating its effectiveness.

ITDP delivered the bicycles and communications equipment to the pilot districts in November, and fielded a team of experts to train local staff in maintenance. The other vehicles are still being discussed. Over the course of the next year, ITDP will be evaluating how well these interventions are working and decide on next steps.

### Bringing Health Care Mobility to Scale

Scaling up to meet the Millennium Development Goals for health requires determining the right vehicle mix, which is context-specific, and building the capacity of local health care providers to finance, maintain, and use the vehicles.

Districts should be the focus of most transport interventions in health care. Within a district, the health care system is the most cohesive and integrated, and environmental factors will be similar. Beyond the district level, regions can vary radically in population density, infrastructure and terrain, and different types and combinations of vehicles are likely to be required.

For example, the Northern Region in Ghana has very low population and road densities, so the big obstacle for health care service delivery is distance. The Central Region has



**left:** Muddy road conditions in Tanzania, especially after rainy seasons, represent one of the challenges to providing efficient healthcare access and service delivery in sub-Saharan Africa.

**right:** Animal-drawn carts are a common form of transportation in rural Senegal.

much higher population and road densities, and hilly terrain and impassable roads are major obstacles.

ITDP recommends developing different district typologies based on terrain, road conditions, population and road density. To do so, we recommend starting at the national level and mapping road infrastructure, population, and health care

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# Dar es Salaam: Africa's BRT Frontrunner

*As plans near completion, the DART may become the continent's first Bus Rapid Transit system.*

*By Karl Fjellstrom*

The much-anticipated Dar es Salaam Bus Rapid Transit system, DART, remains the BRT system most likely to be implemented in Africa. Faced with pressures throughout the planning process to scale down expectations, the city leaders and Project Management Unit have consistently insisted on deliberate planning for a high quality mass transit system and associated transport and public space improvements.

On October 5th, the DART project was officially launched by the Ministry of Transport. A conceptual plan has been completed by Logit, a Brazilian consulting company that won the bidding for the planning under a World Bank loan funded project, in cooperation with local partners Inter Consult. The detailed planning and engineering

design of the first corridor is nearing completion. ITDP, with funding from the United States Agency for International Development (US AID) and the United Nations Environment Programme's Global Environment Facility (UNEP GEF), is assisting with the institutional and regulatory framework, as well as downtown traffic and non-motorized transport planning. The planning is being conducted on site at the Dar es Salaam City Council's Project Management Unit, where the local consultants, international advisers and trainees are based.

The first DART corridors and service features have now been defined, though several detailed planning issues are still being developed. Key features include the following:

- A 21-kilometer 'closed' BRT system, with dedicated 18-meter articulated buses, passing lanes at stations, median-aligned stations, and likely peak passenger demand on Morogoro Road of around 13,000 passengers per hour in one direction.
- A daily passenger ridership of around 200,000 passengers in the system, representing 20% of daily bus trips taken in the city.
- A 'transit mall' exclusively for pedestrian, bicycle and BRT traffic that will extend through the Central Business District (CBD) and along the waterline to the ferry terminal (see map).
- Express services that do not stop at every stop, reducing travel times and improving operating efficiency.



Source: Logit Consultiva/InterConsult

*Proposed BRT station design on Morogoro road*

- Enclosed stations, pre-board fare collection and level boarding and alighting.
- BRT access to the CBD, the Ubungu market area and intercity bus terminal, the main artery of the City (Morogoro Road), the intense Kariakoo market area, wealthy areas to the north of Kawawa Road, and high density housing and mixed development along Kawawa Road.
- High quality pedestrian and bicycle facilities along the BRT corridors, including regular at-grade pedestrian crossings and a segregated bicycle lane on both sides of the corridor.

Institutionally, TANROADS will be in charge of the construction of the system, while an executive agency will be set up to manage and control the system. The existing Daladala bus

operators, in a consolidated and professionalized form, will play an important role as operators in the new system.

Based on a competitive bid, ITDP contracted Deloitte & Touche, a management consulting firm, to work on details of the fare collection and the business plan for the system. Training is ongoing, with local trainees, the PMU, and consultants benefiting from the experience of being directly involved with project planning.

With assistance from ITDP sub-contractor Nelson Nygaard Consulting Associates, non-motorized transport planning is focusing on the CBD area, where the road network is being reconfigured and roads have been classified into four categories: BRT corridors, pedestrian and non-motorized vehicle 'green' roads, shared roads, and

through roads. In addition, a waterfront promenade is being planned. A parking study is being carried out together with the NMT planning to ensure CBD businesses are not adversely affected.

Funding for the implementation of the system has not yet been determined pending the finalization of the business plan and detailed costs of the infrastructure. However, the World Bank is one potential source of funding and is already working on providing loans to fund DART's implementation under a Transport Support Program. Despite the arrival of newly elected leaders in city and national government, it is expected that strong historical support for DART amongst politicians, officials, business figures and the wider community will continue as the project nears implementation.▼

## Scaling Up for Healthcare Mobility in Africa

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infrastructure, overlaid with terrain and road conditions. This, and discussions with local experts, will identify a reasonable typology based on districts with similar characteristics. Most countries are working with Geographic Information Systems (GIS) currently, and many may be willing to share their data from different departments to do the analysis. This analysis will be done concurrently with testing of the new bicycles, telecommunications equipment and maintenance programs.

Using the most common typologies, the total number of district types is approximately 20, but needs to be more fully explored. Districts with the capacity and desire to try new systems should be prioritized. Then a comprehensive district assessment, including human resource capabilities, needs to be conducted, lasting one month if appropriate manpower is available.

Based on this assessment, the next step is to conduct an integrated pilot project that spans all levels in the district, and brings together transport, telecommunications and human resources. Maintenance and repair have to be critical elements to these projects. Given appropriate funding, the project could be implemented within three to six months.

Once appropriate vehicle and communications combinations, communications links with other levels of the health care system, and maintenance regimes are successfully established, the same approach can be applied to other districts with similar characteristics. Ideally, this should be an iterative process where adjustments are made to the vehicle mix, personnel, and maintenance needs over a couple of years. However, because of the deadlines of the MDGs and because of the urgency, scaling up from pilot projects should be done at the same time as the effectiveness is evaluated.

Doing this will also require strengthening the health care system. While the quantity and cost of vehicles are easily identified, the first year and-a-half will require more investment in the human resources needed to evaluate and determine the appropriate mixes of vehicles and communications equipment, and to build capacities to ensure long term sustainability and success. Case studies in Tanzania have shown that investing in the whole system is a cost-effective way of lowering mortality rates. By using transport and communications as a means of investing in strengthening the whole system, we could improve the quality of life for millions of Africans and help save lives.

The transport sector needs to bring expertise together to support the health care sector, while the health care sector needs to be open to possible changes. It will require a commitment by these sectors and funding agencies to work together on making the right recommendations, then ensuring that the resources are there to support it.▼



# Latin America update

*Highly visible efforts geared at improving the livability of Latin America's cities emerge at a pivotal time in the region's development.*

*By Oscar Edmundo Diaz*

2005 has witnessed the initiation of a range of significant sustainable transport projects in Latin America. Despite the fact that many other social, economic and environmental challenges compete for scarce resources throughout the region, Latin American cities have taken innovative and affordable measures to deal with congestion and pollution. The projects outlined in the following pages represent promising interventions with potential for replication in additional cities.

## **Mexico and Central America**

Metrobus, Mexico City's Bus Rapid Transit system on the highly congested Insurgentes Avenue, was launched in June 2005 and, despite some operational struggles at the beginning, has improved its operations in subsequent months. Former Mayor Andrés Manuel López Obrador left his position in mid-July to run for the Presidency, a move that accelerated the launch of the system somewhat prematurely. The Metrobus ticketing system will be in place in mid-October and together with the system control center likely faces several remaining technical problems. Metrobus currently operates at a fare of M\$ 3.5 (US\$ 0.33). Coincidentally, Inbursa, the bank responsible for operating the ticketing system, also provides the loans for procuring Metrobus vehicles.

ITDP provided technical assistance to Metrobus on pedestrian and bicycle integration, and operations management training was provided by the landmark TransMilenio Bus Rapid Transit system in Bogotá. Despite the opening of Metrobus, there is still a lack of political will in

Mexico City to emphasize cost-effective investments in transportation that provide broader public benefits. Construction continues apace for the infamous "Segundos Pisos" (double decker) highways for private automobiles, despite the fact that 80% of all trips in the city are made on public transportation and that systems like Metrobus can be built at 10% of the per-kilometer cost of the highways. The new mayor, Alejandro



*Mexico City's Metrobus was launched in June 2005.*

Encinas, is debating whether to expand the Metrobus systems. Positions on the project vary within the city government and the current debate is whether Reforma Avenue should be the

next corridor. Those in favor of this idea argue that it will be easier to negotiate with the bus owners because there are fewer companies operating on this corridor than in Eje 8, the alternative corridor.

Beyond Mexico City, the Optibus BRT in León has overcome the challenges that surfaced during its first two years of operation and is currently moving 220,000 passengers a day. The imperative now is to obtain resources necessary to build the infrastructure for the following phase,

ward. Plans for the BRT system in the State of Mexico were halted, but following a visit to Bogotá and a meeting with former mayor Enrique Peñalosa, the new governor, Enrique Peña, indicated that the project will be continued as a high priority for his six-year mandate. Querétaro, a picturesque colonial town, is another city with BRT plans that include an integrated system with bicycle paths and pedestrian promenades.

Other cities in Mexico that are actively interested in implementing Bus Rapid Transit systems



*Hope remains that the TransBorde network in Ciudad Juárez, Mexico can continue growing and ultimately link to a similar system across the border in El Paso, Texas.*

which is expected to double the Optibus's current demand. ITDP will be working with Optibus to find a financial solution for the system's expansion. León succeeded in consolidating all bus concessions despite the fact that concessions have posed problems for the expansion of Mexico City's system and the conceptualization of BRT projects in other cities (Bus concessions in Mexico are constitutional rights that are inherited). Ciudad Juárez built a 3.5-kilometer corridor in 2004 as part of its growing TransBorde network, however the new mayor has made no commitment to the project and the system is not currently operating. This is unfortunate in that a unique opportunity may be missed to link the system trans-nationally with a similar BRT system in El Paso, Texas. There is still hope, however, that the governor of the State of Chihuahua adopts the project and continues moving it for-

are Aguascalientes, Chihuahua, Guadalajara, Monterrey, Puebla and Torreón. Such widespread interest in the merits of Bus Rapid Transit is especially encouraging in the face of a substantial lobbying effort by the French-owned Alstom Company to sell trams in Mexico. In a Mass Transportation Congress held in Puebla in October, half a day was devoted to promoting trams as the solution for high congestion and emissions in Mexican cities. The lobbying on behalf of the tram industry at the Puebla Congress was so competitive that in some instances false information was used to describe BRT costs and capacity. Even the French ambassador to Mexico, in his closing statement, promoted the tram as the best solution for Latin American cities.

In Central America, as a result of Enrique Peñalosa's guidance, the Dominican Republic and the city government of Santo Domingo have shelved their subway project and are considering a more affordable, appropriately-

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designed BRT system. In Panama City, the debate continues about implementing a light rail or bus rapid transit system even though the financial analysis shows that under a reasonable fare structure a light rail system would be too expensive to operate. In spite of this, the Alstom Company continues pushing for a light



*Guatemala City is creating more pedestrian-friendly spaces.*

rail solution for Panama City. In Guatemala City, a BRT project has been green lighted and the city is enjoying new sidewalks in an effort to create more pedestrian-friendly spaces.

### South America

Several BRT projects are under development in South America. Besides Bogotá's TransMilenio expansion, four Colombian cities (Barranquilla, Cali, Cartagena and Pereira) are in the construction stage or will be starting construction in 2005, and three more will start building the infrastructure in 2006 (Bucaramanga, Medellín and Soacha). Bogotá itself is still drawing international attention for its BRT system; prior to TransMilenio's International Mass Transportation Fair that takes place in Bogotá on November 8 and 9, 2005, the city

Bottom photo: Enrique Penabaz

*Under Mayor Jaime Nebot's leadership, Guayaquil has created a walkway along its waterfront.*

received 281 delegations from 42 different countries. Pasto, a city of 500,000 in the south of Colombia, joined the World Car Free Day on September 22, organizing an event that was supported by 90% of the population. Bucaramanga, population 600,000, also celebrated a Car Free day with great results.

ITDP is working on the TransCaribe BRT in Cartagena thanks to a Global Environmental Facility (GEF) grant through the United Nations Environment Programme. ITDP is supporting the project in three key aspects — operational design, institutional capacity building and public space and bike integration to the system. The detailed operational design was delivered to TransCaribe in September. This study was crucial to make decisions on the infrastructure design and construction and saved the project 50% in property acquisition. In October, TransMilenio's senior staff provided training for the TransCaribe team. ITDP also developed the study for the bike path that will run along the TransCaribe corridor and in 2006 will deliver the bicycle path master plan.

In Ecuador two cities are taking the lead in sustainable transport. Quito, with its trolley bus and its integration with the new BRT corridor Ecovía, continues to be a model for other developing country cities. Quito's successful Car Free Sundays are the result of the good work and perseverance of the non-governmental organization Biciacción ("Bike Action"). Guayaquil will start operating its BRT in February 2006. The current mayor, Jaime Nebot, is also developing projects that include a beauti-





ful walkway along the waterfront, public space recuperation, and urban revitalization in poor neighborhoods.

In Sao Paulo, Brazil a pilot project funded by a GEF grant through the World Bank aims to reduce greenhouse emissions from urban transport and to promote a modal shift to more efficient and less polluting forms of transport, such as bicycling. ITDP is part of the team working on the bicycle network. Sao Paulo has also relaunched Car Free Sundays with great success. Hundreds of thousands of people are taking to the streets of this congested Brazilian mega-city. Even though the event's site is small, measuring ten kilometers, it represents a great start and a wonderful place where everyone meets as equals in a clean environment. With the support of the non-governmental organization Rua Viva, 71 Brazilian cities joined the World Car Free Day on September 22.

20 years ago, Sao Paulo started closing off roads to cars and transformed these same streets into pedestrian areas. In subsequent years, due to congestion in the city's center, the authorities decided to open pedestrian streets like Sete de Abril back up for cars. However, this only resulted in worse congestion. Due to the high pedestrian volumes, pedestrians, street vendors, and cars are fighting for the same space. ITDP will be assisting in addressing this problem in the Celso García corridor with experts that have experience with similar urban redevelopment challenges in Central Europe.

Joint efforts by ITDP and the Interface for Cycling Expertise (I-CE) have also led to a national-level cycling promotion initiative under Brazil's Ministry of Cities. ITDP has been working with the Urban Mobility Department at the Ministry of Cities on strategies for implementing the Ministry's Mobility Program for cities with more than 500,000 inhabitants. While the local government is in charge of the planning, implementation and management of the Mobility Program, the Ministry of Cities sets the program's parameters. The Ministry

plans to publish a sequence of five documents that include planning for Bus Rapid Transit and Non-Motorized Transport.

The bus transportation reorganization project in Santiago, Chile opened in October 2005 following the resolution of problems that had delayed ticketing operations. Lima, Peru is also under development and will start operations at the end of 2006.

Finally, a new entity has been created, SUS-TRAN LAC (Sustainable Transport for Latin America and the Caribbean), an NGO that encourages mutual cooperation among the different organizations in the region. SUSTRAN LAC is supported by a consortium of NGOs that include ITDP, I-CE (the Netherlands), and GTZ (Germany). The official launch will take place during Velo Mondial 2006 in Cape Town, South Africa.

Latin America is growing rapidly and there is a great opportunity for its cities to become more environmentally sustainable and socially equitable. However, there are many challenges to overcome. Authorities should pay closer atten-



*With the support of the NGO Rua Viva, 71 Brazilian cities joined the World Car Free Day on September 22.*

tion to the suburban development that continues at a brisk pace across the region. Suburbs represent a significant threat to the sustainability of Latin America's cities because they promote low-density growth that prevents mass transit systems – bus rapid transit, light rail, or subway – from being affordable, readily available in service frequency, or of high quality. Suburban growth is facilitated by

highway construction, and many Latin American cities continue to build urban highways in an attempt to reduce congestion. On its present course, this process is laying the groundwork for a disastrous long-term trend of continued automobile emissions, traffic fatalities, and the social disintegration of communities.

Car use can be restricted with congestion charging, bans on automobile circulation during peak hours, or fuel taxes, but the most effective method is the traffic jam, because it forces people to live closer to the city and rely on mass transportation systems.v

# Quality Bicycles in Africa

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improves, this would give the sub-Saharan Africa bicycle industry annual sales of \$1.5 billion by 2020, from an existing market of about \$276 million. The market in the projected

all have developed bicycle master plans with ITDP input, and Cape Town and Dar Es Salaam have incorporated extensive bicycling facilities in their BRT plans that were also initiated by ITDP.

While ITDP advocates for tariff reductions on bicycles through the regional coalition Sustran Africa based at UN

| Sub-Saharan Africa (SSA) Bicycle Market | Existing (9.6 bikes per 1,000) |               | 2020 (20 bikes per 1,000) |               |
|---|--------------------------------|---------------|---------------------------|---------------|
|   | SSA                            | CBC Countries | SSA                       | CBC Countries |
| One Speed FOB                           | 18                             | 18            | 40                        | 40            |
| Retail Price (using 100% mark-up, \$US) | 40                             | 40            | 80                        | 80            |
| Total Population of SSA                 | 719,000,000                    | 168,000,000   | 950,000,000               | 231,000,000   |
| Total Quantity of Bikes                 | 6,902,400                      | 1,612,800     | 19,000,000                | 4,620,000     |
| Retail Market of New Bike Sales (\$US)  | 276,096,000                    | 64,512,000    | 1,520,000,000             | 369,600,000   |

Phase I CBC countries (South Africa, Ghana, Senegal, Tanzania, Kenya, and Uganda) should increase from an industry with roughly \$64.5 million in annual sales to some \$369 million by 2020. This does not include the sales potential for parts, accessories, repairs, and clothing, which account for roughly half of all retail sales in established bicycle markets.

## ITDP's Support for the Bike Market

ITDP hopes that eventually the CBC will become a self-financing cooperative of independent bicycle dealers in sub-Saharan Africa. We also hope that other quality brand names like Trek, Fuji, Specialized, Shimano and Sram will enter the African market under their own name, building on the CBC's success.

In the meanwhile, ITDP will continue to support the CBC by focusing on the harder job of increasing bike use in

Habitat, we are simultaneously working to help increase bicycle manufacturing in Africa. ITDP is initiating this work with ISENCY, a bicycle factory in Senegal, where we will



*BRT system planning in Accra, Dakar, and Dar es Salaam all include bicycle infrastructure integration, as is seen in this rendering of a proposed BRT corridor in Dakar.*



*Colonel Mbareck Diop, ITDP Senegal, presents the California Bike to local leaders at the first Car-Free Day in West Africa.*

the major cities with promotional events, like the six Car Free Days we sponsored in Ghana, Senegal and South Africa over the past year.

ITDP is also working on the design and construction of safe bicycling infrastructure. Accra, Cape Coast, and Dakar

attempt to produce the California Bike. In this way, the existing punitive tariff can be avoided and local job creation is increased. However, these bikes will not be branded California Bikes until their quality is proven. A team of ITDP experts will be working in the ISENCY factory beginning in November of 2005.

## Conclusion

While the rest of the world still thinks of Africa as a land of famines and wars, many countries in Africa are stable democracies lifting themselves out of poverty. As these countries take off, African cities find themselves at a critical crossroads. They will either become automobile dependent or bicycle-friendly.

The automobile industry has already noticed that Africa is a market to take seriously, and cars are flooding into African cities. The bicycle market, as of yet, is untapped and open, promising rapid growth. With the growing success of the California Bike Coalition, ITDP hopes that the global bicycle industry taps into that market and helps it grow. Ultimately, cycling in Africa will only survive if a dynamic private sector industry exists there to support it. ✓

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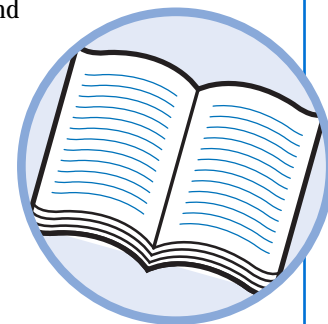
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