



Nairobi is one of few world capitals to boast a national park within its borders. Lying to the south of the downtown area, Nairobi National Park, created in 1946, is the only place in the world where tourists can take a photo of a lion or a giraffe or even a black rhinoceros with skyscrapers looming in the background.

The park covers some 45 square miles of open plains, broken bush, the Athi River and its deep gorges, long grass, short grass, flat land and foothills, and, in the western uplands, the Kisembe Forest. For Nairobi, the forest may be the most important habitat in the park.

Kisembe forest is, in fact, the southern fringe of what used to be the extensive Langata Forest and is comprised of Crotons (e.g., *Croton dichogamus*), African olive (*Olea africana*), Muhugus (e.g. *Brachylaena hutchinsii*), Cape Chestnuts (*Calodendrum capense*) and other indigenous species. One of few remaining large expanses of tree cover in Nairobi, it is sometimes called the “lungs of the city.”

Whether the forest will continue to play that role is an open question. Kisembe, and indeed the entire park, is threatened by the rapid and largely unplanned expansion of Nairobi, one of the fastest-growing cities in all of Africa.

The larger Nairobi metropolitan area had a population of 6.1 million in 2007, which is projected to rise to over 12 million by 2030. Much of this growth is occurring as sprawl, as areas on the city edge absorb spillovers from the central city, where scarce rental housing is increasingly unaffordable to average citizens. This growth, combined with a lack of investment in public transport and urban road infrastructure, has resulted in increasing road deterioration, numbers of motor vehicles, and congestion.

Millions of Nairobi's residents (up to half the population, by some estimates) live in informal settlements: shanty towns and slums with few or no services, bad roads, and little access to clean water. Open cooking fires are common, as are trash fires. The city also has limited public transportation, so people living in the informal settlements rely on a huge fleet of privately run minibuses called *matatus*. Not only are they dangerous—*matatus* with riders dangling out the windows of even on the roof are a common sight downtown—they tend to be old and poorly maintained, so they spew pollution across the city. Add the fact that the lack of roads means the *matatus* and the thousands of diesel trucks and buses entering the city everyday often sit idling in epic traffic jams and you have a recipe for choking smog.

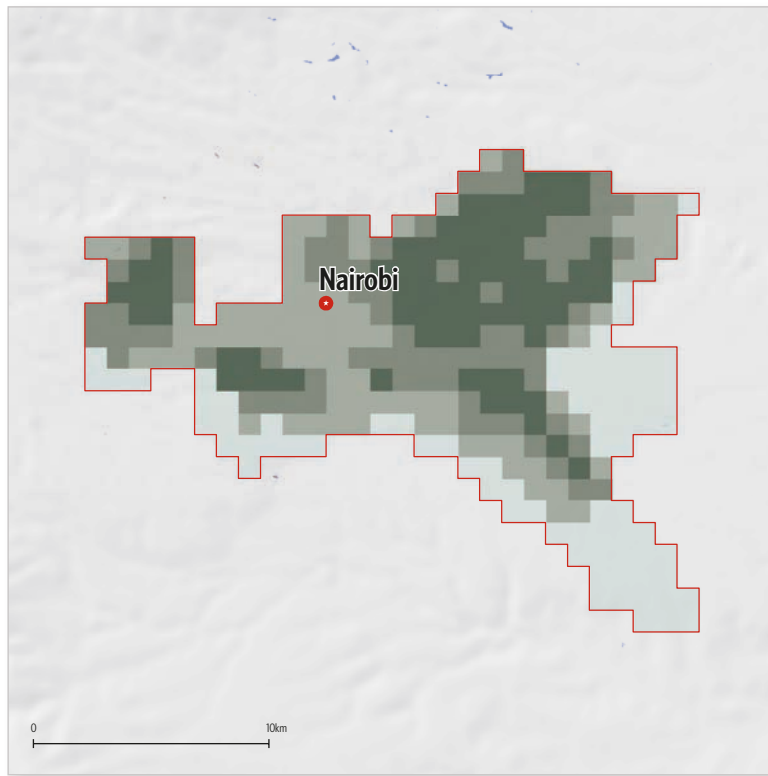
Nairobi is attempting to address the problem in several different ways. First, in 2014, the Kenyan National Assembly enacted progressive and robust air-quality regulations intended to curb pollution of air by vehicles, factories, and other sources by ensuring minimum air-quality standards for both mobile and stationary sources. When fully enforced, industries using old and inefficient technologies will be required to adopt improved emission-reduction technologies or transition to cleaner industrial processes.

Nairobi also has an ambitious plan for future development called Nairobi Metro 2030. Largely focused on improving the city's international economic competitiveness, it outlines the development of a transport master plan to improve transportation infrastructure and land use planning, including an urban mass-transit strategy that centers around investments in high-occupancy buses and modernization of the existing commuter rail network. How effectively the municipal and national governments, often plagued with corruption and dissent, will translate the vision of the plan into tangible improvements for Nairobi's residents remains a largely unanswered question.

Some of Nairobi’s efforts to solve the traffic congestion problem may be at least partly self-defeating. A major new highway, the Nairobi Southern Bypass, and an expansion of a railway line threaten to slice through Nairobi National Park, and Kisembe Forest, in particular. In response, the Kenya Wildlife service in partnership with private companies is managing the Green Line Project, an initiative to plant forest along 30 kilometers of the perimeter of the park. The hope is to create a visible boundary between the park and surrounding new developments, and to discourage lobbying by developers to cut slices off the park. The program, which began in 2010, is part of a broader effort created by the late Nobel Prize winner Wangari Maathai to plant new trees throughout Nairobi to improve water catchment and biodiversity.

Compared to other cities globally, Nairobi has a moderate ROI of tree planting for PM removal. Neighborhoods in the center and northeast of the city have the highest ROI. Because PM<sub>2.5</sub> concentrations are relatively low in Nairobi, according to the global dataset we used, we estimate that the absolute reduction would be less than 1 µg/m<sup>3</sup> for most people.

## Results from the Nairobi study



Map 23. Neighborhood-level ROI for Nairobi (PM reduction).

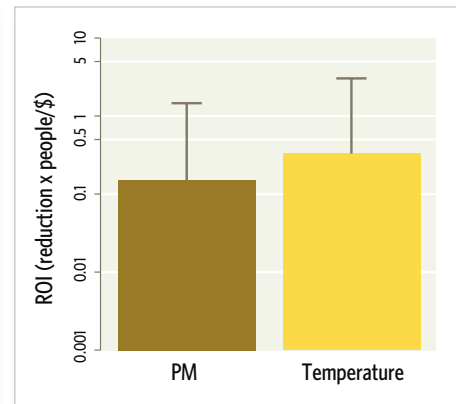


Figure 28. ROI for tree planting for Nairobi.

Investment	Annual Cost (\$)	> 1 ug/m <sup>2</sup> PM <sub>2.5</sub>	1.5 deg C
10% of sites	158,000	0	267,000
20% of sites	311,000	0	406,000
Full Investment	1,520,000	0	683,000

Table 16. Temperature and PM reduction benefits under three investment scenarios for Nairobi.