IMPROVING URBAN LIVING

Better city planning in Zambia

Ordnance Survey

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INTRODUCTION

To power economic development, nations need a detailed digital picture. Ordnance Survey and its partners the International Growth Centre and Commonwealth Association of Architects, produced detailed map data in a few weeks. With a better understanding of where everything is, nations can plan services to improve quality of life for their citizens.

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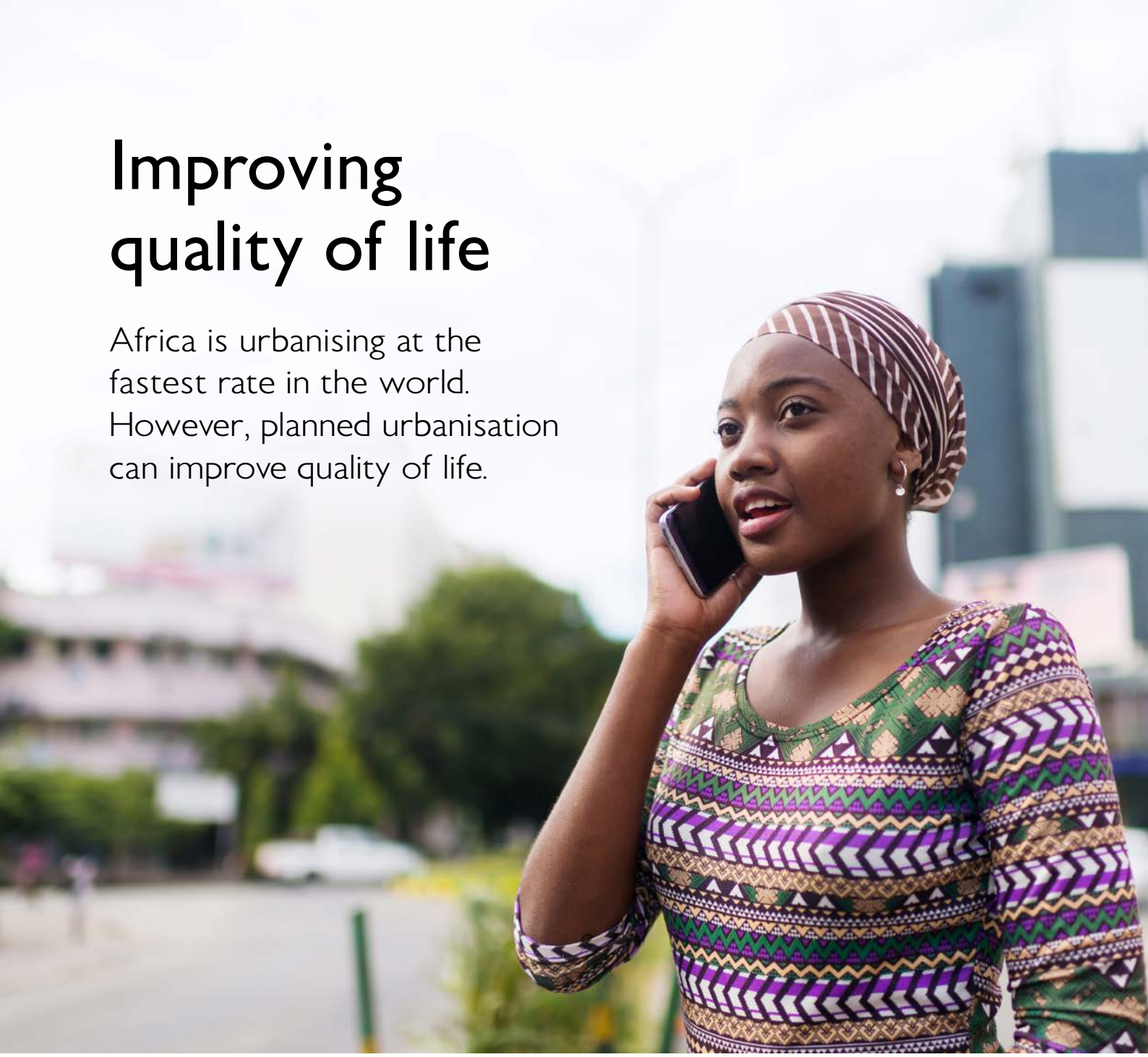
IGC International Growth Centre

Improving quality of life

Africa is urbanising at the fastest rate in the world. However, planned urbanisation can improve quality of life.

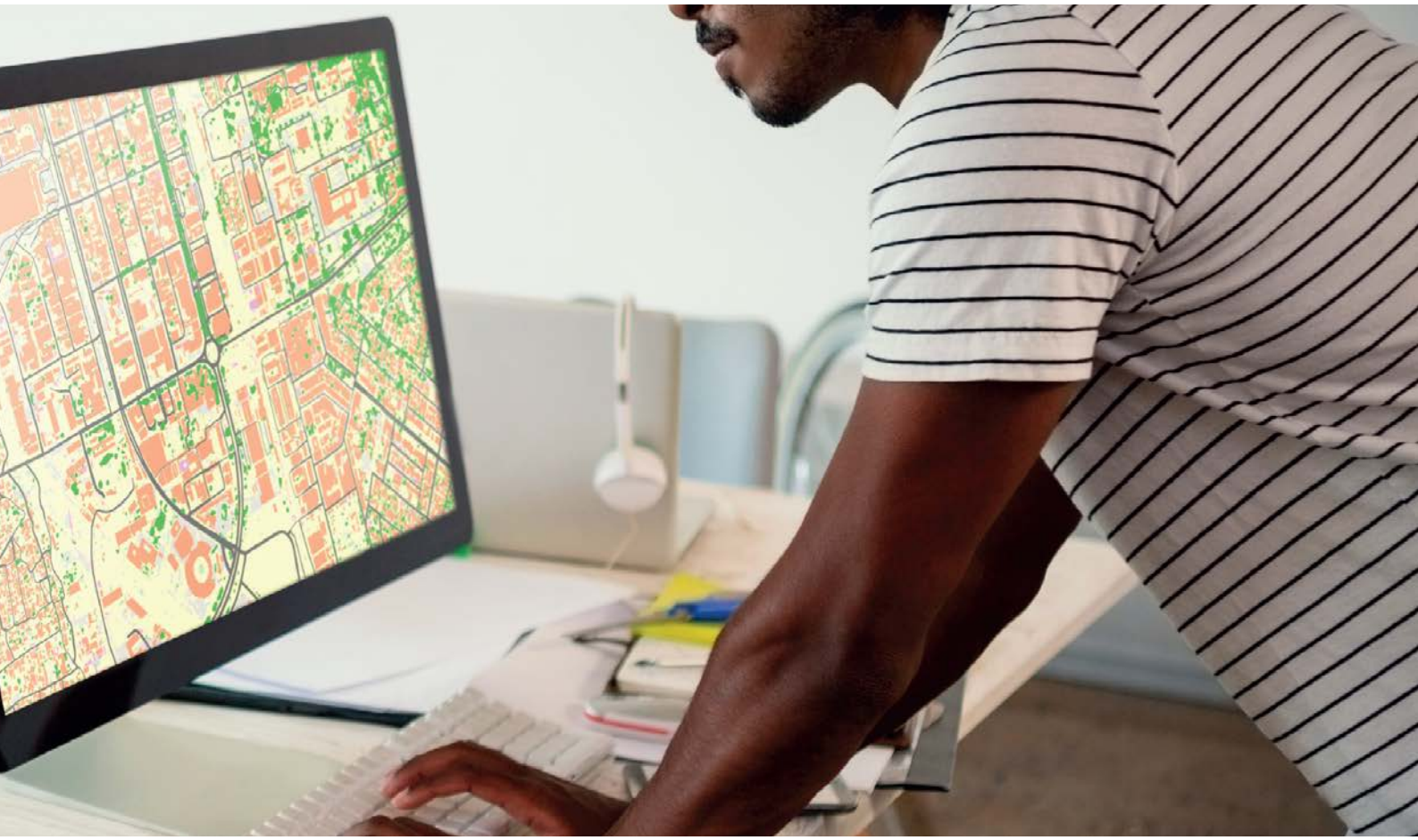


If well-managed, urbanisation can be transformative, creating jobs, reducing poverty, and improving quality of life with better access to healthcare and cleaner water.

Informal settlements make up over 54% of the urban population in Africa. This is a problem because retrofitting infrastructure such as water, electricity and sewage is three times more expensive[1].

Understanding the bigger picture leads to informed decisions.

1. https://www.theigc.org/reader/making-urban-land/land-policy-needed-coordinate-investment-settlement-private-sector-cannot-alone/



Advanced mapping technology

It's now possible to quickly and accurately create a map of any area from aerial imagery.

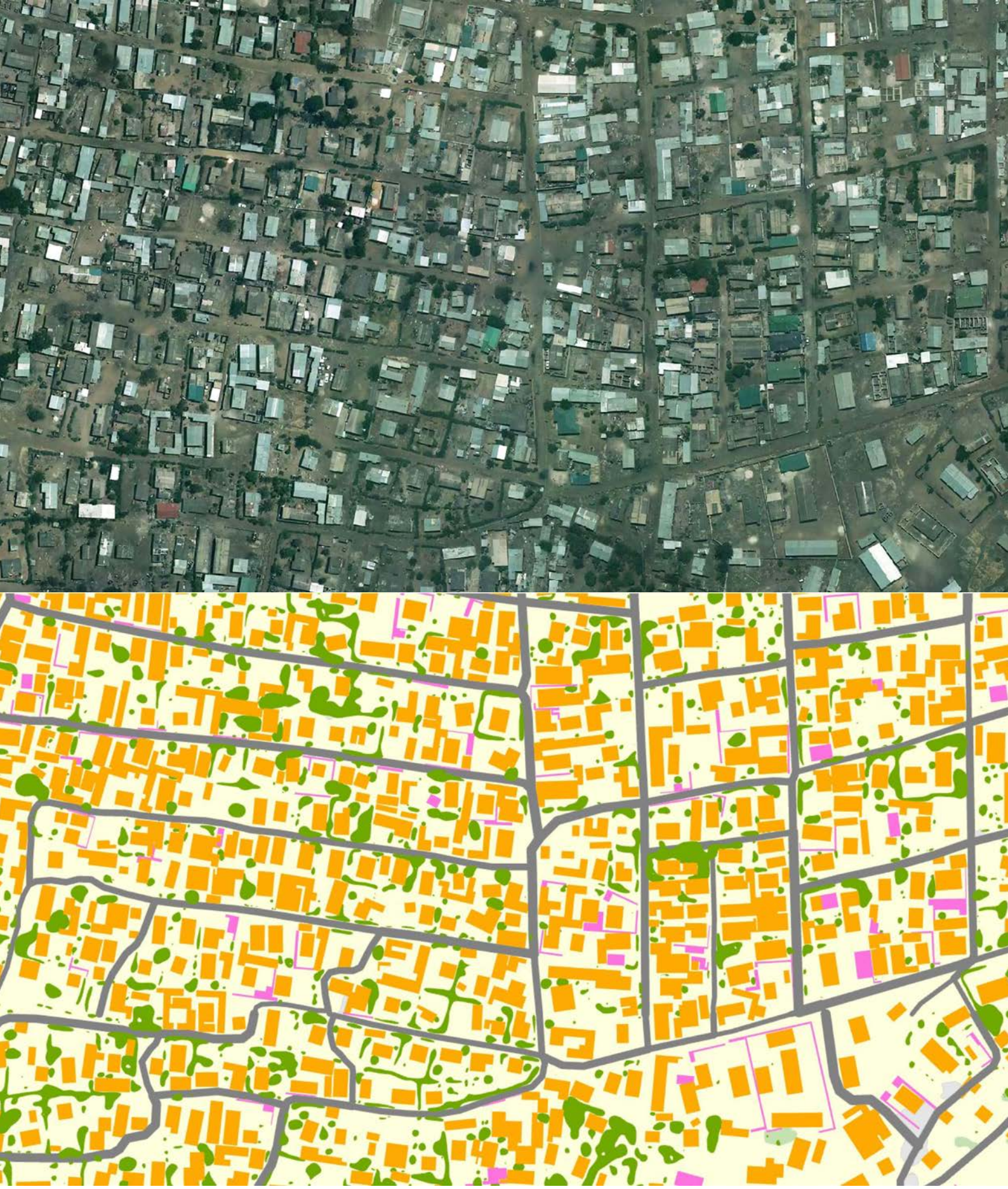
These new mapping techniques were tested in Lusaka, Zambia giving planners a clearer picture of the city's rapid urbanisation.

Faster mapping using machine learning

We trained machines to label data and trace features such as buildings, roads and water.

This algorithm classifies and learns what the various features are, so when we pass imagery through it produces a map based on the features it has been taught.

To help train the algorithm, we used the vast and rich data set of Britain and its features, to train the algorithm used for the Lusaka base map creation process.



The process can identify buildings, roads, water and other features from the imagery.

The process is fast. Ordnance Survey generated 420km^2 of detailed basemap in 10% of the time compared to manual processes.

“A map is critical to display the location of infrastructure. Governments see this as a game changer.”

Joseph Minango
Surveyor General, Ministry of Lands & Natural Resources, Zambia

Getting the bigger picture

The Government of Zambia was able to gain a picture of Lusaka's urbanisation.

A map is a fundamental building block for socio-economic growth.

By identifying urban features, we gain information about population and density, the number of structures, the location of transport infrastructure surrounding the formal and informal neighbourhoods, as well as access to electricity, sanitation facilities and clean water.

This enables the Ministry of Local Government, Zambia to better target investment in critical infrastructure and services, and develop informal settlements to provide for the most vulnerable residents. It will also assist in better planning for urban expansion, which reduces the overall cost of infrastructure investment, limits informality, and enables more resilient and sustainable urban futures.

This programme will promote the value associated with accurate and relevant spatial data. The rapid delivery of a scalable and replicable national digital base map is not only relevant to cities such as Lusaka, but also has far reaching benefits at national and regional scale.

Key benefits to Government of Zambia

In Zambia the digital map can include further data, to give government agencies more information and clarity to improve decision making.

For example:

- Identify residential properties for the census
- Provide the foundation for street addressing for land management and taxation
- Plan and manage disaster response like flooding or pandemics
- Evidence based planning

All of which help to create bankable projects to promote further investment in the municipality.

Future use cases

A detailed digital map provides the foundation for other data to be added providing many use cases, including;

Land administration – Geospatial information provides the fundamental building blocks that enable effective land administration through addressing and the creation of base maps. Addressing is key to extending vital public and social services to residents of informal settlements.

Land tenure – A base map can show property boundaries to be identified and registered, supporting land tenure. Secure land tenure allows citizens to buy and sell housing and supports an effective mortgage sector which unlocks the hidden capital in urban property. Good land tenure also supports resolution of land rights disputes and the efficiency of collecting land and property taxes therefore increasing municipal revenues..

Planning and infrastructure - Up-to-date digital records regarding population density and land use can give urban administrators better insights into where residents are and what they might need. Whether it is the location of a new road, a hospital or a library, geospatial data is essential for informing your decision making.

Safety and services - Geospatial data and tools provide the backbone of all urban public services. Accurate, universal base maps are essential for a city's law enforcement, fire services and ambulances to reach their destinations safely and quickly. Geospatial tools also foster collaboration and break down silos between service providers by supplying a common ground truth shared between agencies.

Utilities and connectivity - Cities need reliable supplies of water, power, and telecoms, including connectivity technology like fibre broadband and 5G. As cities grow and these utility networks expand, planning and maintaining utility assets, like cables and pipes, becomes more costly and challenging. Establishing utility coverage and connectivity to informal settlements can help to lift regions of a city out of urban poverty.

Transport planning - Effective movement of people around cities is crucial for employment and economic growth, as well as ensuring equal opportunities and access to services for citizens. Geospatial data can help to make mobility in cities faster, cheaper and more efficient. Public transport can be a key asset in lifting urban residents out of poverty by making jobs and schools in other parts of the city accessible to all.

Effective urbanisation with geospatial information

Urbanisation without planning can lead to informal settlements, urban sprawl and degradation in the quality of life of citizens. Cross-sector planning and decision making informed by geospatial data and implemented by effective governance are the most powerful tools available to help municipal governments make a success of their city. Using consistent geospatial frameworks across cities provides the ability to make decisions based on similar criteria and with access to similar types of information, at both national and local government levels.

Geospatial information is essential for meeting the challenges of modern urban living and can be a powerful tool for transformational change in cities. UN Habitat estimates that 65% of the 169 targets underlying the UN's 17 Sustainable Development Goals are linked to territorial and urban development[2].

Building your own location data capabilities enables you to see how your specific city is used and how its citizens behave. Establishing a good baseline of geospatial maturity will help you make informed policy decisions and help you demonstrate the results of those decisions to citizens and investors.

More than 80% of global GDP is generated in cities[3]. Using geospatial information, urbanisation can be optimised to maximise revenue and cost savings, including:

- **Staff time reduced by up to 90% in planning[4].**
- **Reduced commute times by up to 65%[5].**
- **40% reduction of time taken to deliver public services[6].**
- **Reduced operating costs in public transport by 10%[7].**
- **6x increased return on investment in utility asset management.**
- **Cost benefit ratio of 1.7 in flood mapping[8].**

2. https://unhabitat.org/sites/default/files/2020/02/financing_sustainable_urbanization_-_counting_the_costs_and_closing_the_gap_february_2020.pdf
3. https://www.worldbank.org/en/topic/urbandevelopment/overview
4. https://www.westerncity.com/article/how-gis-can-save-money-and-increase-efficiency-cities
5. https://worldengineeringday.net/wp-content/uploads/2020/03/Smart-City-IOT-WFEO-Version-1.pdf
6. https://www.esri.com/about/newsroom/arcnews/simplifying-the-census-in-cape-verde/
7. https://www.geos.ed.ac.uk/~gisteac/gis_book_abridged/files/ch59.pdf
8. https://www.nap.edu/read/12573/chapter/8#82

Five steps to more effective urbanisation

01 Identify the unique challenges facing your city

Every city is unique. What are the problems you hope to solve with geospatial information?

02 Understand key policy drivers at a national and local level

What are the factors driving your decision making? For example, health, transport, disaster management.

03 Identify key stakeholders and potential users of geospatial information

Who is working with geospatial data in your city? Which industries stand to benefit?

04 Work with them to understand their objectives and issues

What is keeping your stakeholders up at night? Establish how geospatial information can help.

05 Build services using data that help meet these challenges

What services would help to address your policy drivers and stakeholder requirements?

We're actively looking for cities to partner with us to demonstrate how detailed geospatial information can help manage urbanisation. Register your interest:

Internationalenquiries@os.uk

It is now easier and quicker than ever to build your own geospatial data capabilities.

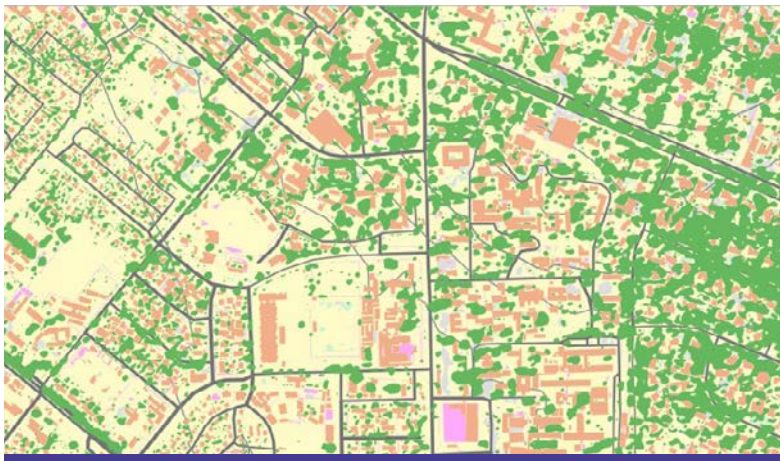
By working with Ordnance Survey, you can combine 200 years of mapping expertise with the speed and usability of modern technological innovation, to deliver a solution that harnesses your city's potential.

Ordnance Survey's centuries of experience in building base maps that underpin growth and empower communities can help you establish your own data capabilities, giving your city the edge over others.

Ordnance Survey can work with your city's government to automate mapping of informal settlements, using the latest Earth observation and artificial intelligence technology.

Base maps created by Ordnance Survey will provide data:

- **Identifying and locating the number of built structures across the city including informal settlements and their size**
- **Showing how the formal and informal neighbourhoods are served by roads and public spaces**
- **Assessing the density of population based upon the number of buildings**
- **Predicting informal settlement growth, their potential capacity and extents**



Consider a **geospatial maturity assessment** provided by Ordnance Survey to identify how you can upgrade your geospatial ecosystem,
plot a route towards more effective urbanisation and start your city's journey towards becoming a Spatially Enabled Society.

Visit os.uk/gma

Ordnance Survey provides funding, consultancy and technology services to governments helping to break down silos and improve policy decisions across urbanisation, environment and sustainability, land tenure, resilience and statistics collection.

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