



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



TOWARDS DEVELOPMENT OF NATIONAL HUMAN SETTLEMENT LAYER

The launch of 2013 SANSa SPOT 5 National Mosaic, The Innovation Hub, Pretoria

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Introduction

Why are researchers and scientists studying human settlements?

- Human settlements affect various aspects of planning and management
 - Environmental /natural resources management, urban planning/rural development, disaster management, policy formulation and implementation, infrastructure development, population estimation, land use management, service delivery....

Satellite remote sensing

- Advancement in remote sensing technology: spatial, spectral and temporal resolutions
 - Map the location of human settlements
 - Monitoring of human settlement developments
 - Accurate and independent evidence of the status of human settlements
 - Extraction of data/information for sustainable human settlement planning
- 

South African human settlement developments

- The proportion of people living in urban areas increased from 52% in 1990 to 62% in 2011
- Everyone has the right to have access to adequate housing- Constitution of the Republic of South Africa
- Implementation of government priorities rely on current human settlement information
- Challenges
 - Housing backlog
 - Access to basic services
 - Informal settlement development
 - Rapid urbanisation
- Impact of human settlement developments
 - Infrastructure : water, electricity, social services
 - Encroachment on the agricultural land and protected areas

Human settlement mapping initiatives

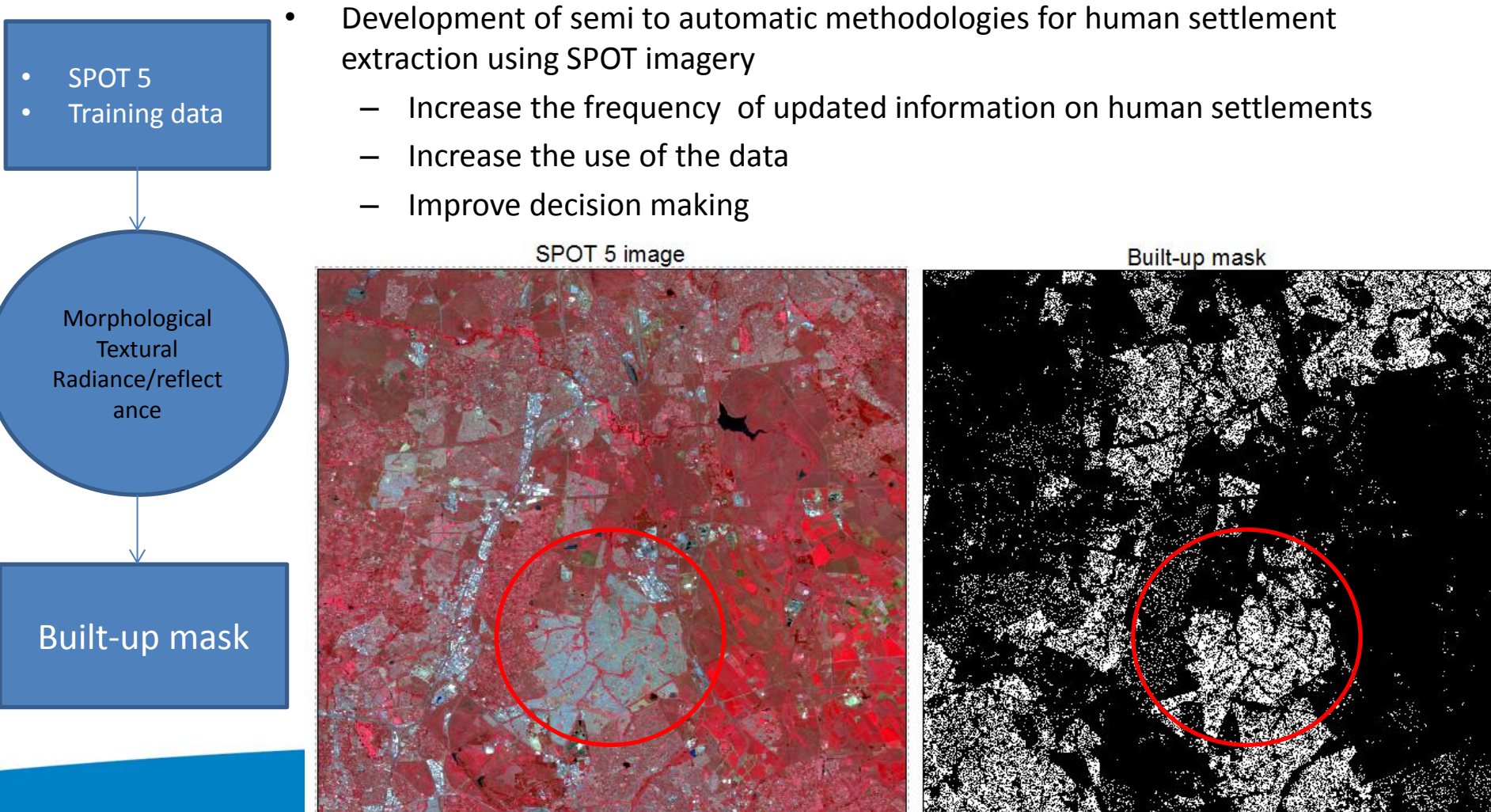
International initiatives on human settlement mapping and monitoring using remote sensing:

- GEO, Global urban Observation and Information, Modis Land Cover Products, Urban Environmental Monitoring, Mega cities/Euro-cities, Global Urban Observatory , Global Human Settlement Layer, FAO land cover (Africa)
- available at global or regional scale

In South Africa:

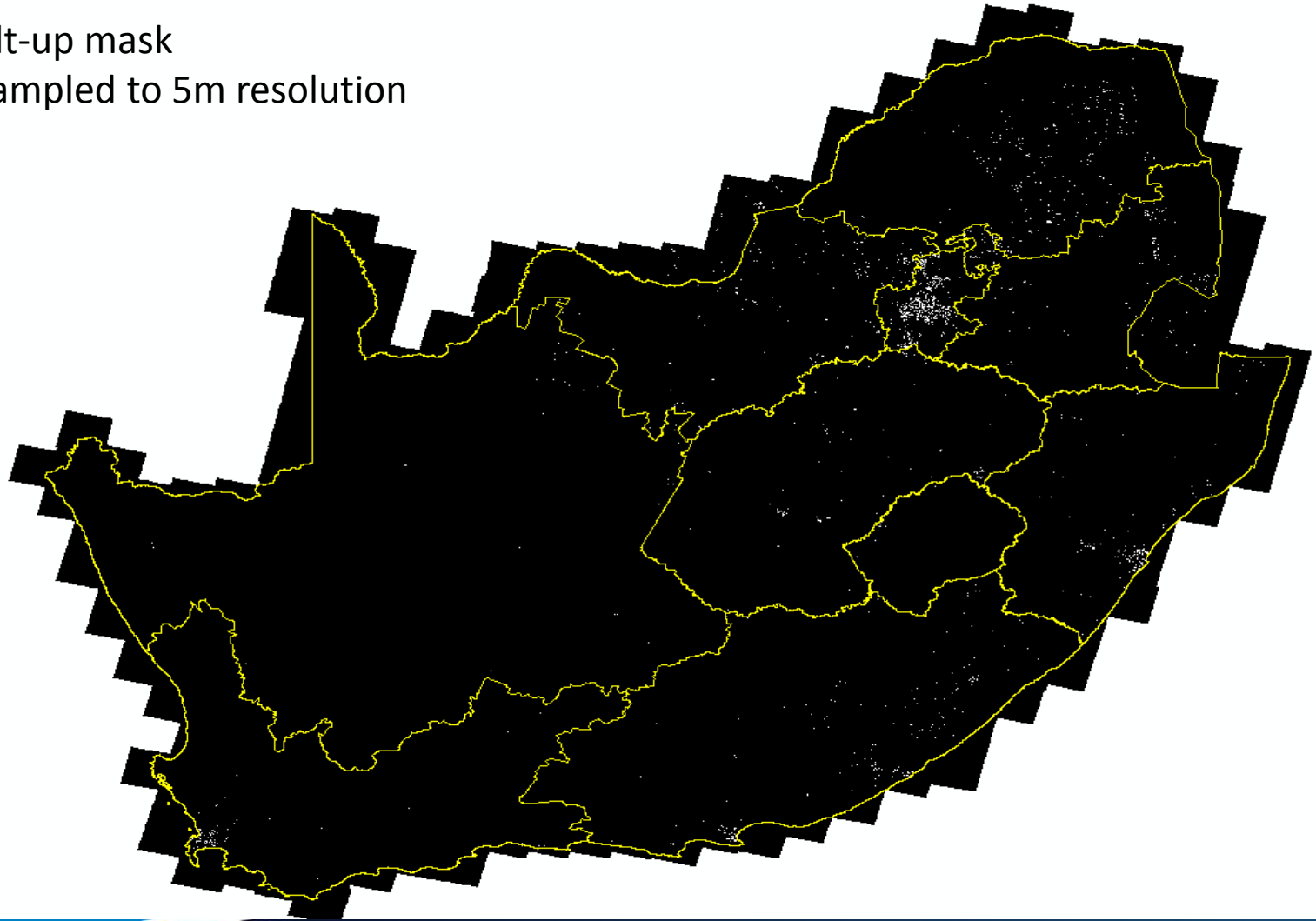
- Eskom's SPOT Building Count (SBC), DWA villages, Land cover land use, Dept. Human Settlement products, STATSSA Dwelling frame
 - Development of these data sets is time consuming and resources extensive
 - Some of these data sets are outdated

SA-National Human Settlement Layer

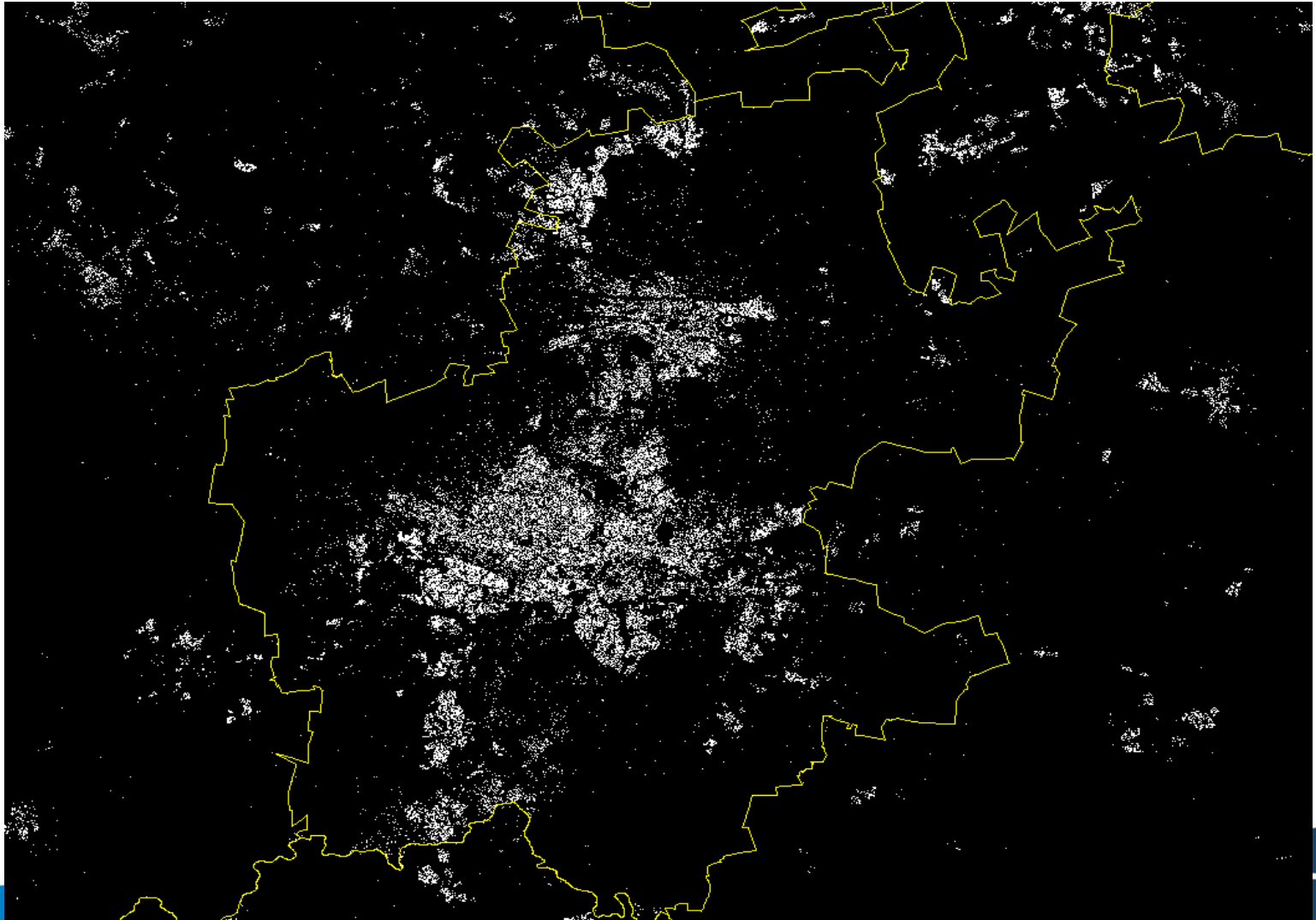


2012 National Human Settlement Layer

- 2012 built-up mask
 - Resampled to 5m resolution

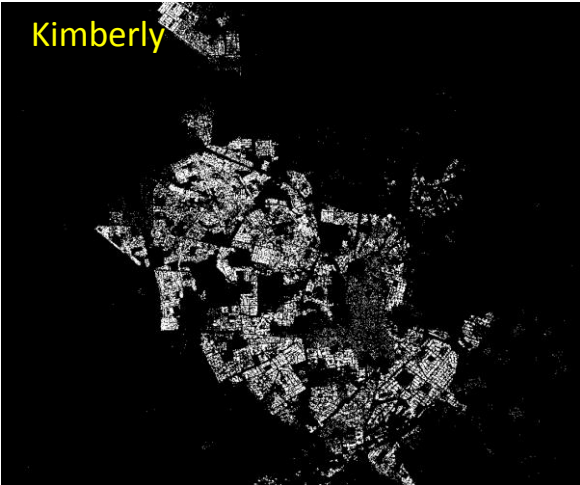


Built-up mask - Gauteng

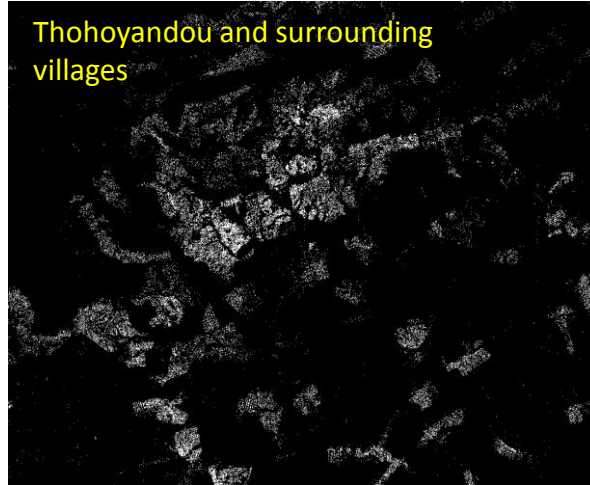


2012 Built-up mask

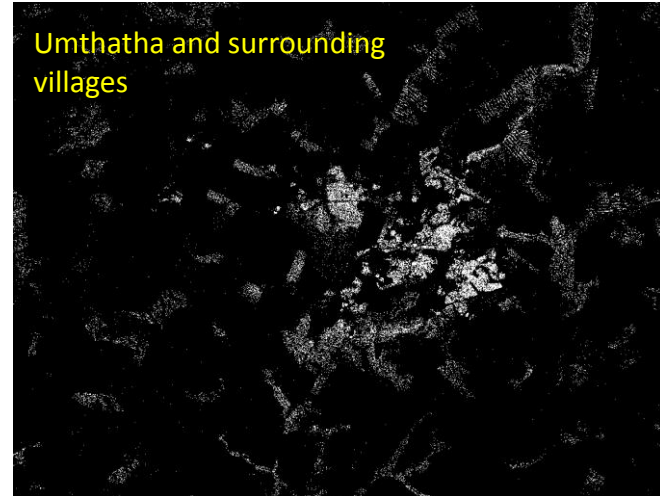
Kimberly



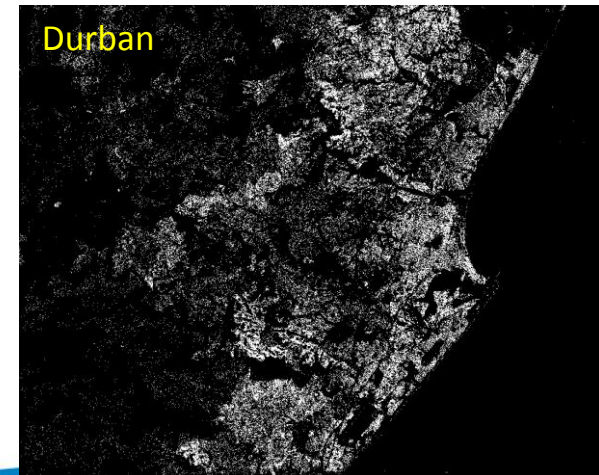
Tohoyandou and surrounding villages



Umthatha and surrounding villages



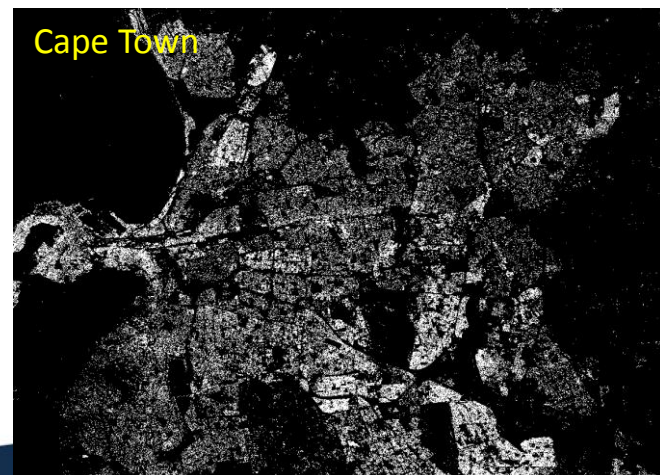
Durban



Bloemfontein

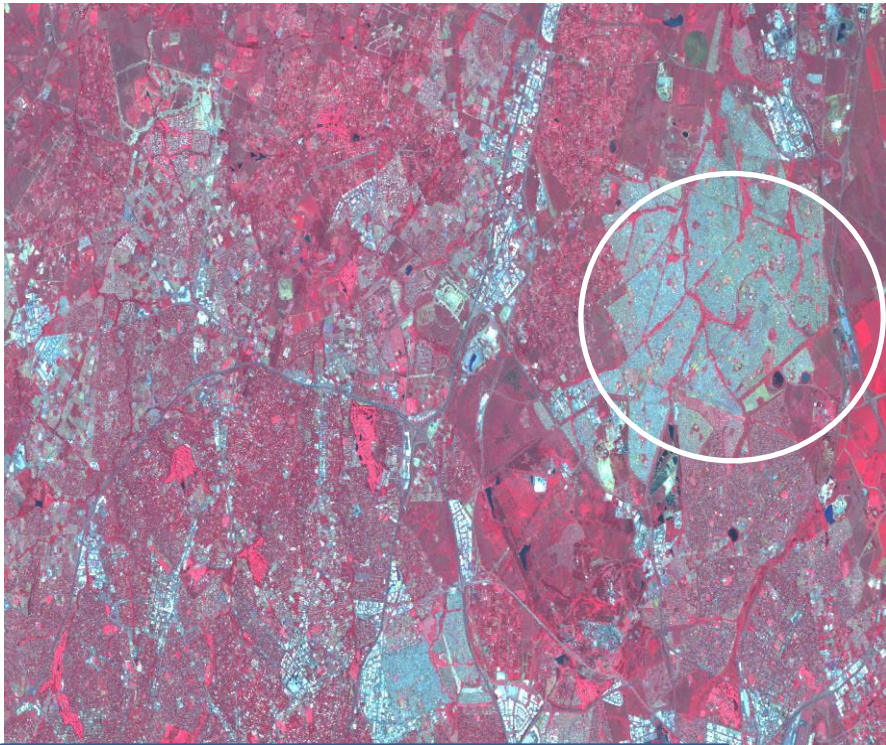


Cape Town

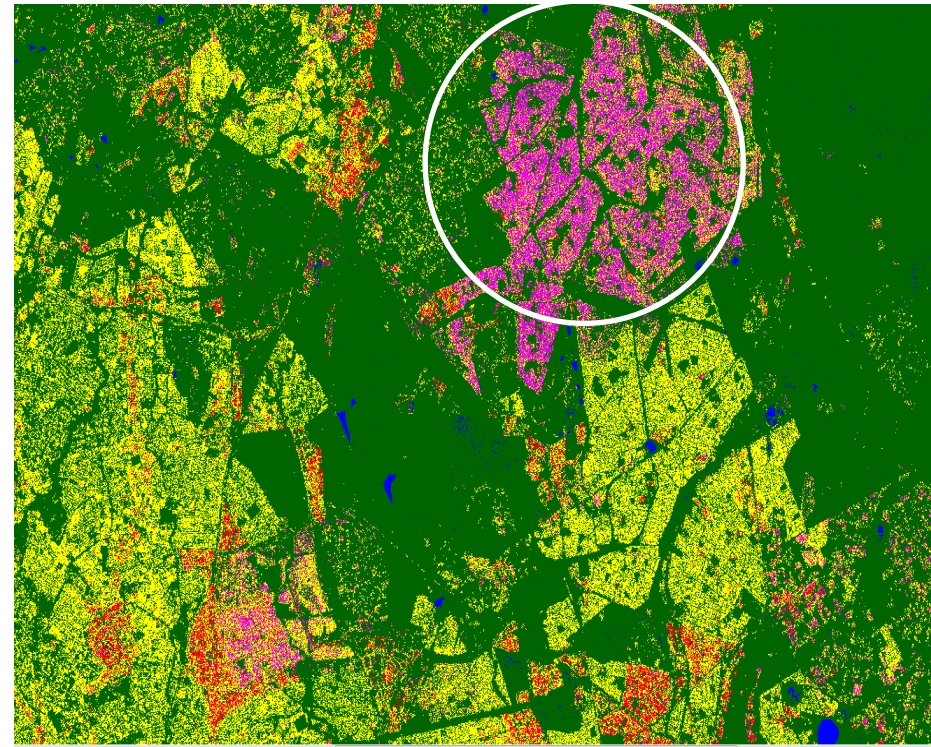


Characterisation of built- up structures

Original SPOT 5 image



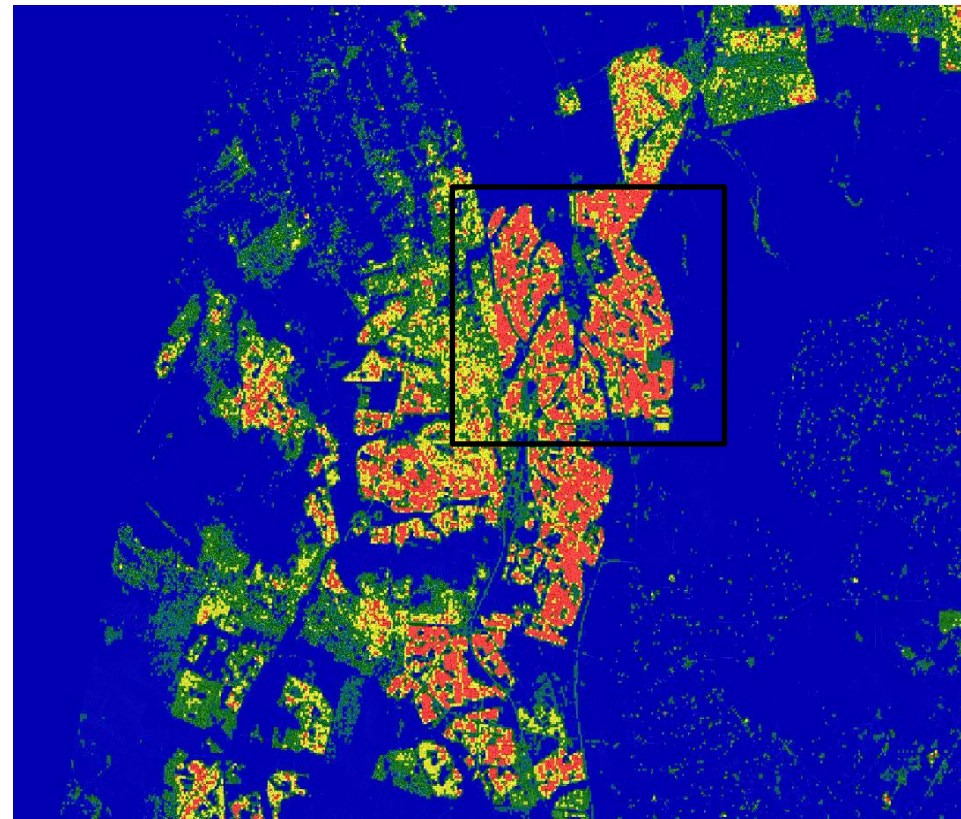
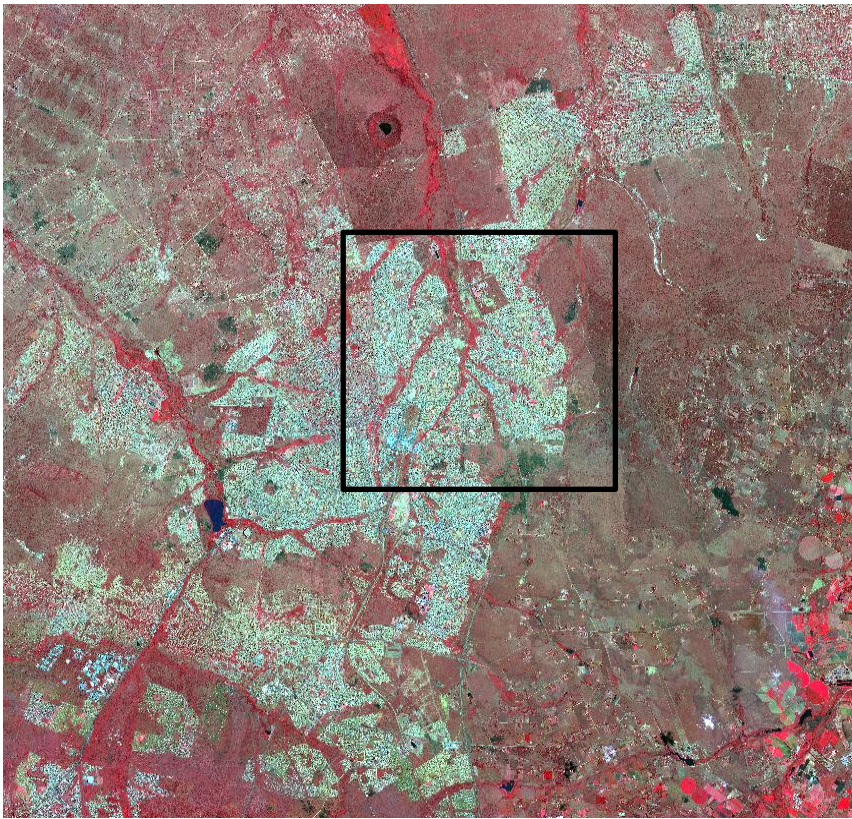
Classification building structures



- Land use management
- Demand of service
- Integrated planning

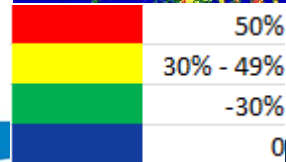
	Townships/informal
	Other residential
	Industrial/commercial
	Non- built up

Building density from national human settlement layer

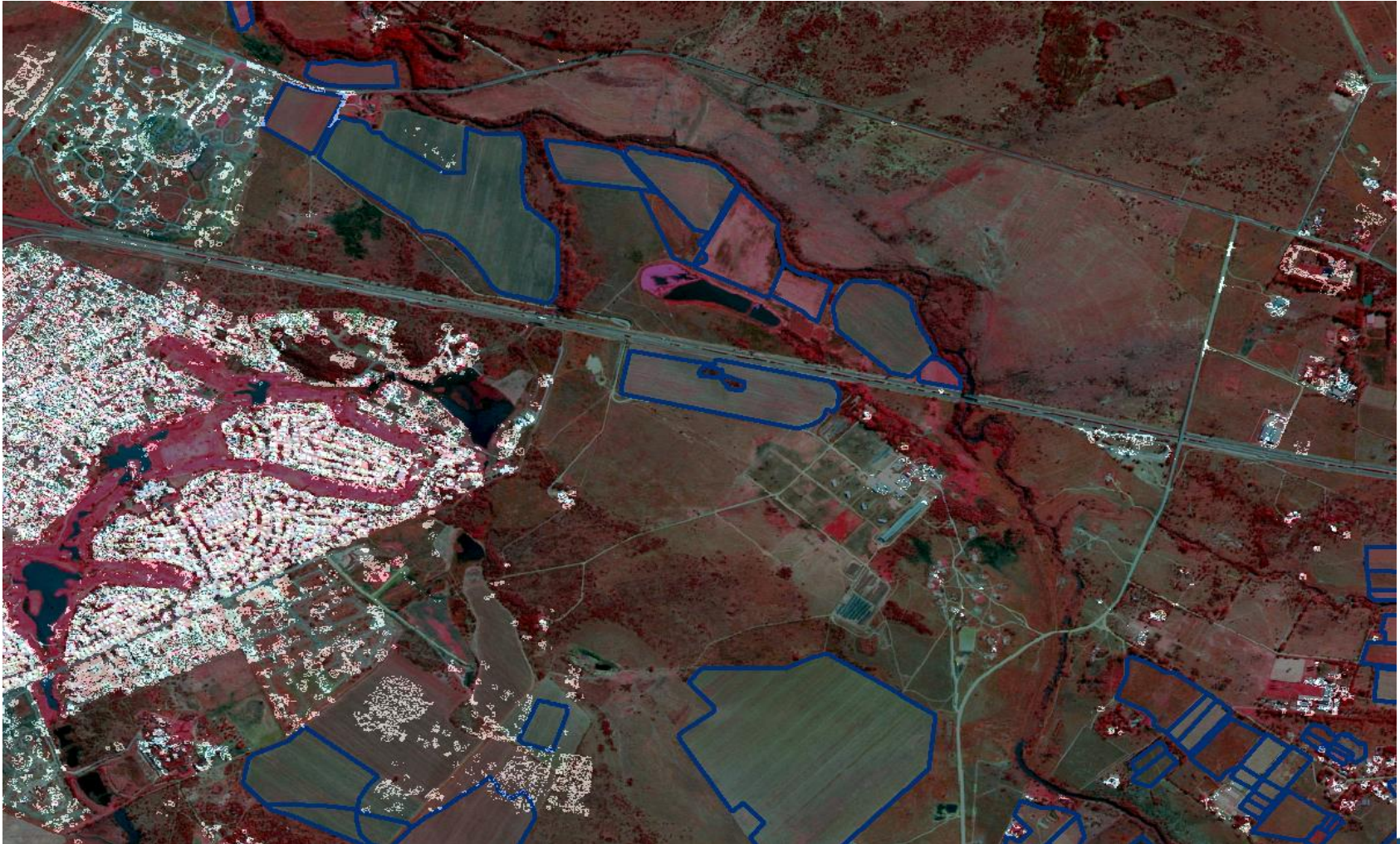


Building density maps

- Population
- Demand of service
- Disaster management

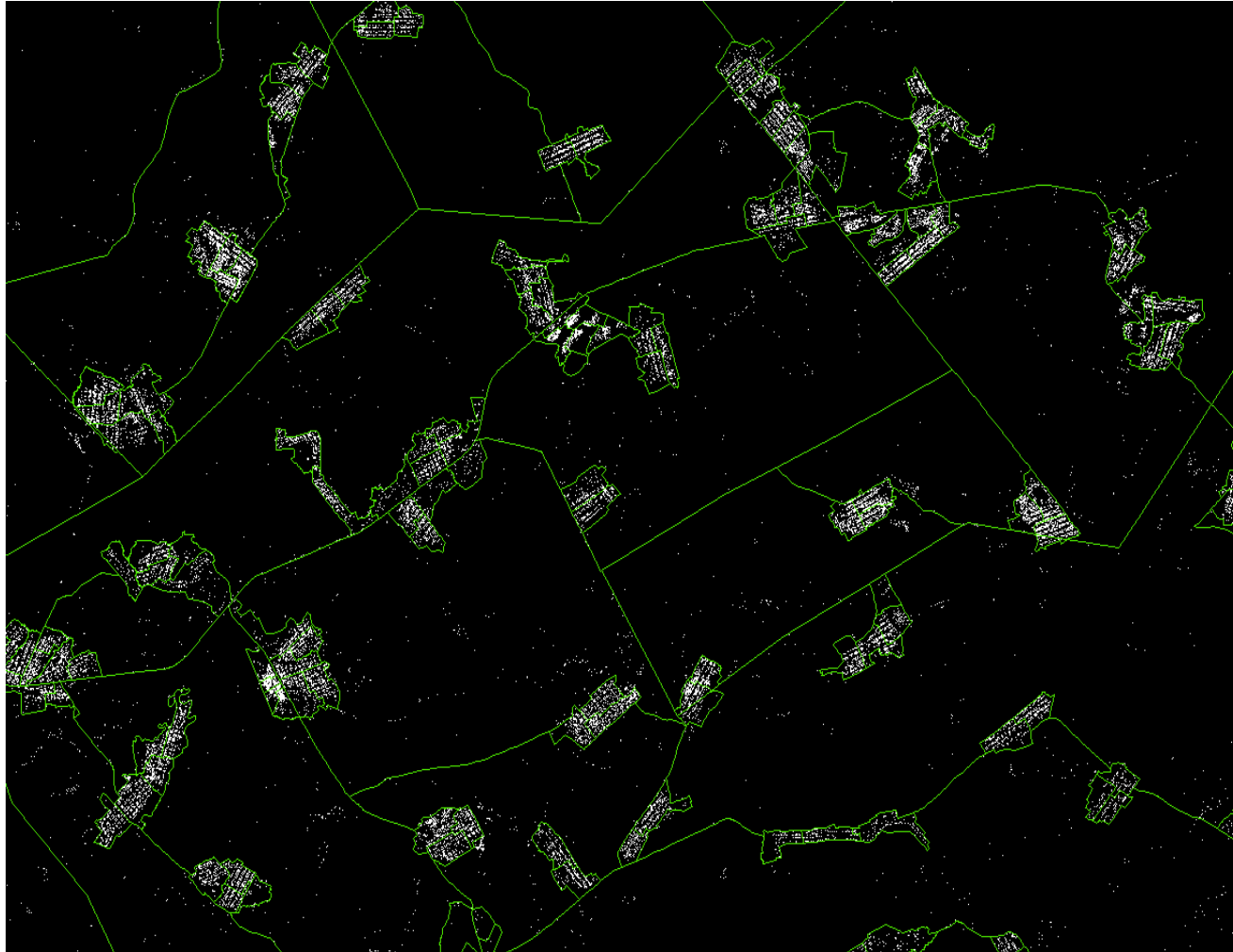


Encroachment of human settlements into agricultural land




2006 SPOT image, 2008 Agricultural Field Boundaries

GIS update and planning of service



- GIS update
 - Demarcation
 - Enumeration areas
 - Villages
 - Educational/health facilities
- Demand analysis
- Master planning
- Integrated planning

Activities on the national human settlement layer

- Methodology improvement
 - SANSA – JRC partnership
 - Global Human Settlement Layer (GHSL)
 - GEO Global Urban Observation and Information task
 - Quality assurance
 - Value adding products as per user requirements
 - Change detection using archive SPOT 5
 - New products using SPOT 6 and other sensors
- ☐ Case studies on human settlements
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Informal settlement change detection

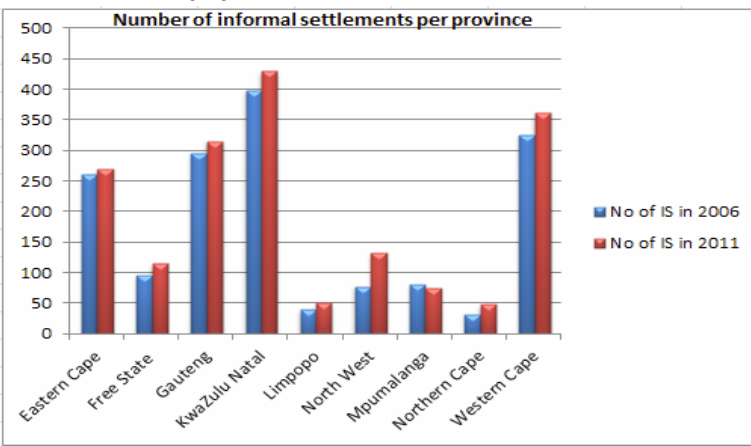
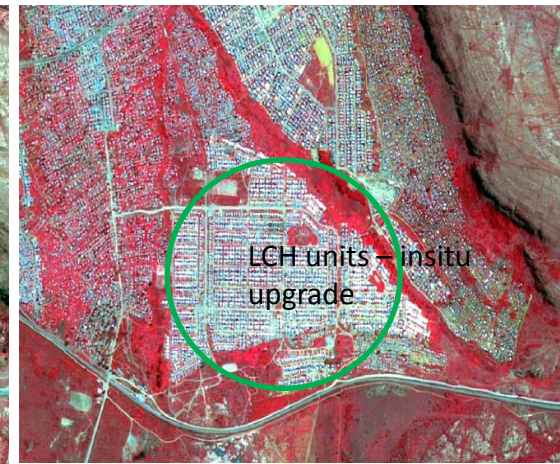
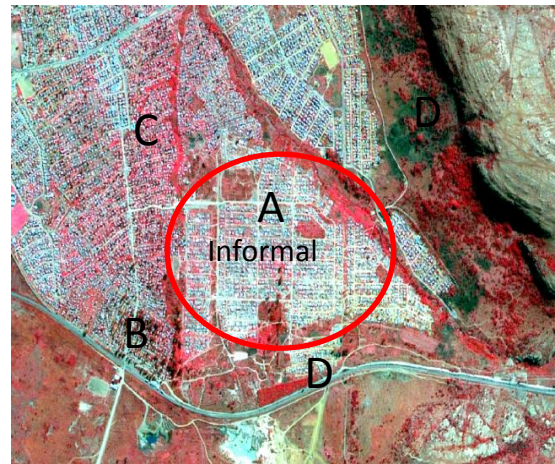
- SANSA and NDHS
- 2006-2011 change detection
 - Using SPOT 5 imagery
 - Location and extent (area)
 - 45 priority municipalities
- Results
 - 2006 = **1 602** , 2011 = **1 793** (see graph)
 - 2006 = **182.687 Km²**, 2011 = **205, 762 Km²**
- Trends
 - Informal settlement decline (**A**)
 - Expansion of informal settlement (**B**)
 - No change (**C**)
 - New informal settlement development (**D**)



2006

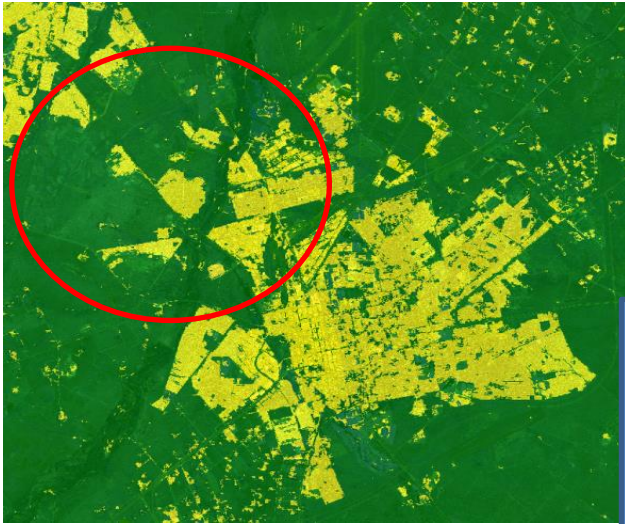


2010



Urban growth assessment

Polokwane 2006



Polokwane 2013



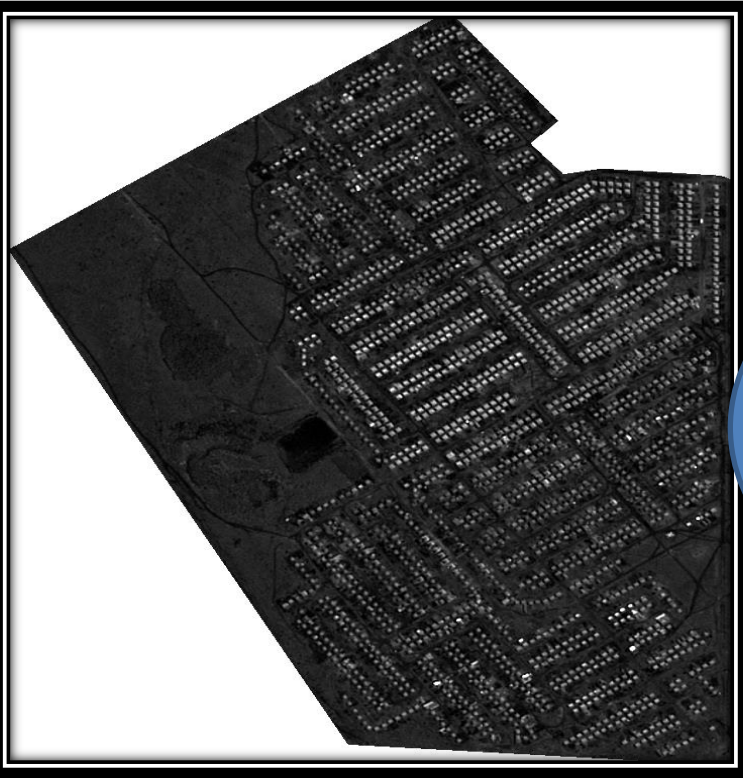
Urbanization rate?
Causes?

- **Future plans**
 - ❖ Reduce the negative impact

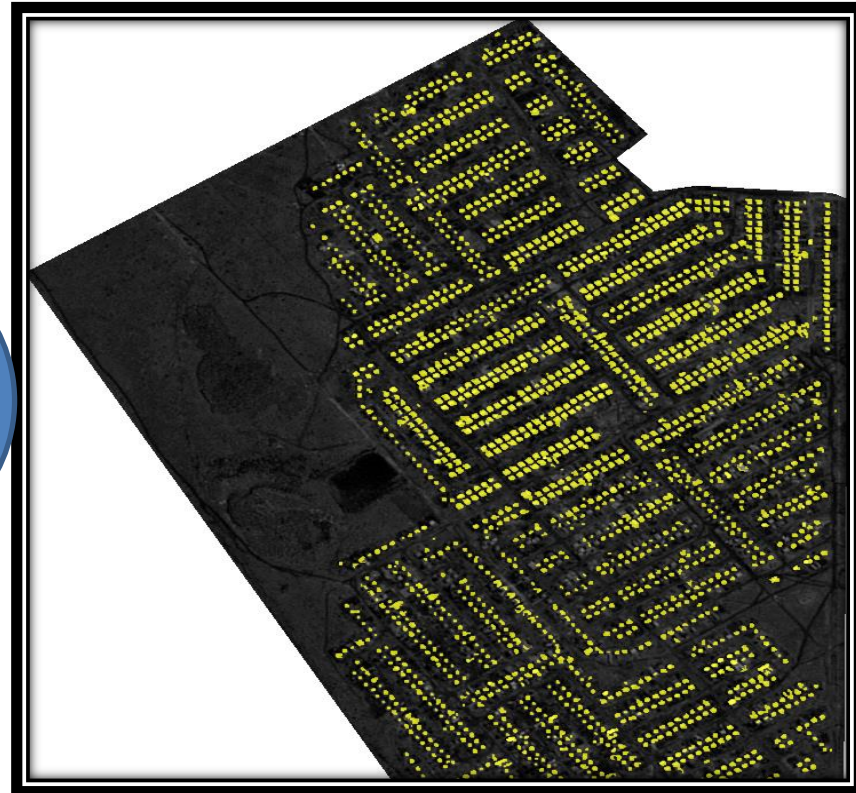


Low cost housing mapping

- Extraction of LCH units



Automated
building
extraction



- Tracking of government's investments
- Living condition assessment
- Improve reporting

Benefits of human settlement data

Organisation/Departments	Applications
National Department of Human settlement, provincial, district -local	Informal settlement upgrade planning and monitoring, low cost housing verification/progress assessment
Eskom	Electrification planning and load forecasting
Municipalities	Spatial planning and infrastructure development
Statistics South Africa	Population estimate and census planning
Independent Electoral Commission	Voting districts mapping/update
Housing Development Agency	Habitable land assessment
Department of Performance Monitoring and Evaluation	Performance monitoring of publicly funded projects/tracking government's investments in infrastructure projects
Municipal Demarcation Board	National demarcation boundaries update
Rand Water	Infrastructure monitoring and planning
Rural Development and Land Reform	Cartographic map update, land management
Department of Environment Affairs	Human settlement encroachment into protected areas
Department of Agriculture	Human settlement encroachment into agricultural land
Provincial Government Dept.	Informal settlement upgrade planning and monitoring, low cost housing mapping, etc

Legislative mandates

- Housing Act 107 of 1997, BNG 2005, Government Outcome 8, ISUP, Integrated Residential Development Programme , Rural housing programme
 - SPLUMA
 - Conservation of Agricultural Resources Act
 - Environmental Management : Biodiversity Act
 - Millennium Development Goals
 - National Development Plan
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THANK YOU