

SLUM MAPPING

SOME REFLECTIONS ON METHODS USING VERY HIGH
RESOLUTION IMAGES

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OUTLINE

- What is a slum
 - UN-HABITAT's definition
 - Global Slum Ontology
- Slum mapping
 - Purpose
 - Methods – data sources and data acquisition
 - Aerospace (spatial data)
 - Field-based methods
- Current research directions
 - Geo-Object Based Image Analysis (GEOBIA)

SLUM DWELLERS AND SLUMS

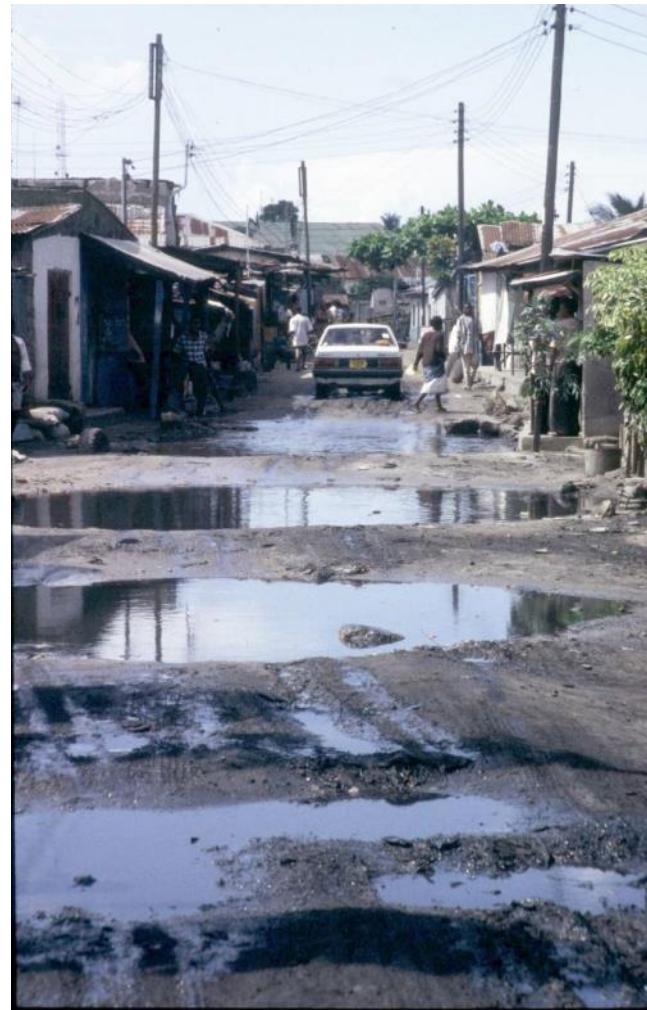
Who are slums dwellers?

- UN 2002: Urban households lacking at least 1 of the following:
 - Adequate water
 - Adequate sanitation
 - Sufficient living space
 - Secure tenure
 - Durable housing (quality of structures & environment – hazards)

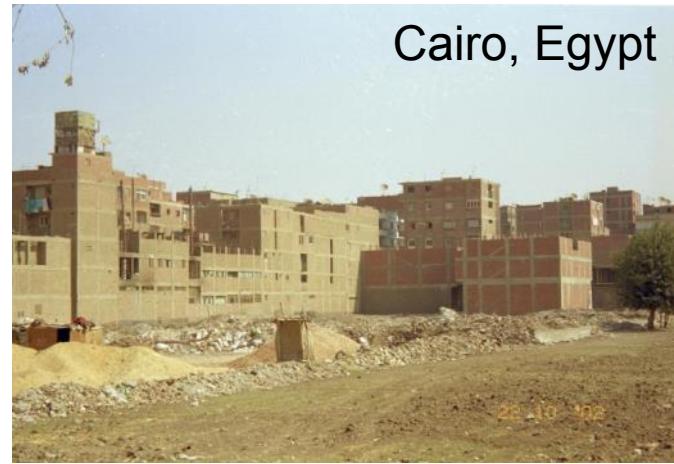
www.unhabitat.org



SLUMS: SPATIAL CONCENTRATION OF SLUM DWELLERS - DIVERSITY OF PHYSICAL FORMS AND SETTINGS



Dar es Salaam
Tanzania



Vizag, India





Libya: can we see the slum areas?

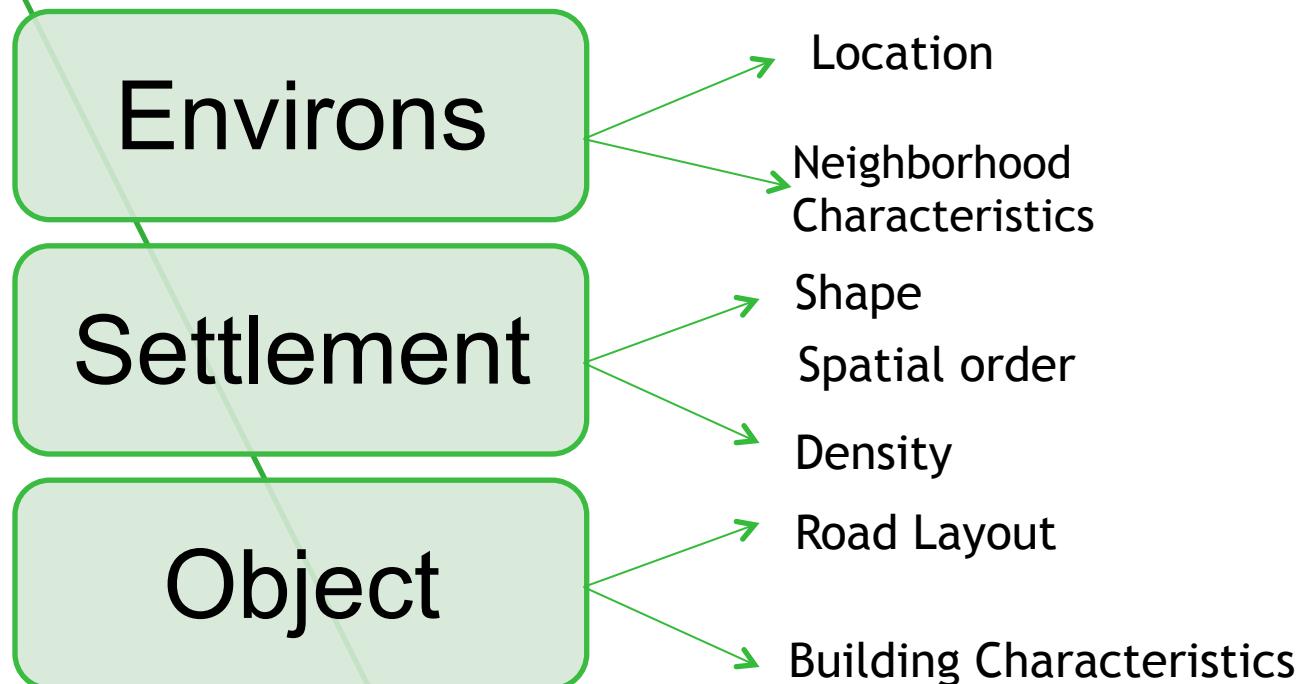
Source: J. Turkstra UN-HABITAT

DURABLE HOUSING

- Principle research focus is on building a robust method to map and monitor *durable housing* as an indicator of slums
- House is a physical asset – visible and (generally) immovable
- Link to land occupation and tenure
- Occupants (owners/tenants) can be spatial registered via house
- Building quality: building materials, state of repair (roofs) and some building standards (size, location aspects perhaps)
- Also include Neighbourhood quality: (adjusted) planning standards for neighbourhood development – open space, road access (widths, pattern, connectivity)
- Hazards: natural and technological – not always visible, often high degree of spatial-temporal variability (e.g. floods, landslides, industrial accidents)

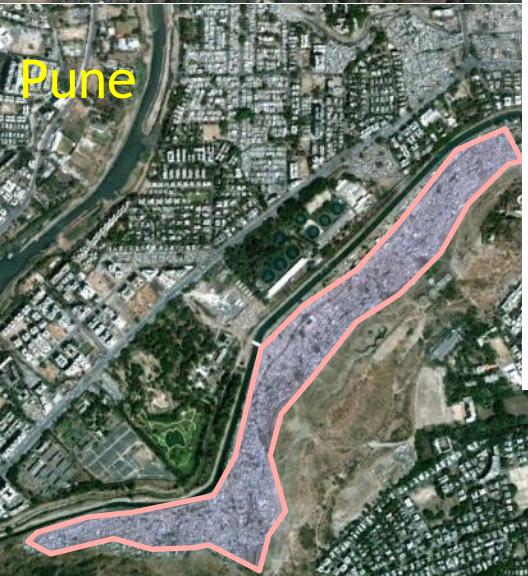


GLOBAL SLUM ONTOLOGY (PHYSICAL)



Kohli, D., Sliuzas, R. V., Kerle, N., & Stein, A. (2012). An ontology of slums for image-based classification. *Computers, Environment and Urban Systems*, 36(2), 154-163.

Aerial views of slums in different contexts with visual interpretation



Cape town

Nairobi

Key variables used

- Colour, shape, size, tone, pattern
- Size of houses
- Roads: Lack of or irregular
- Lack of vegetation
- Lack of open spaces
- Building Density (compactness)
- Irregularity of layout
- Roof materials
- Absence of / irregular roads
- Association with environs



OUTLINE

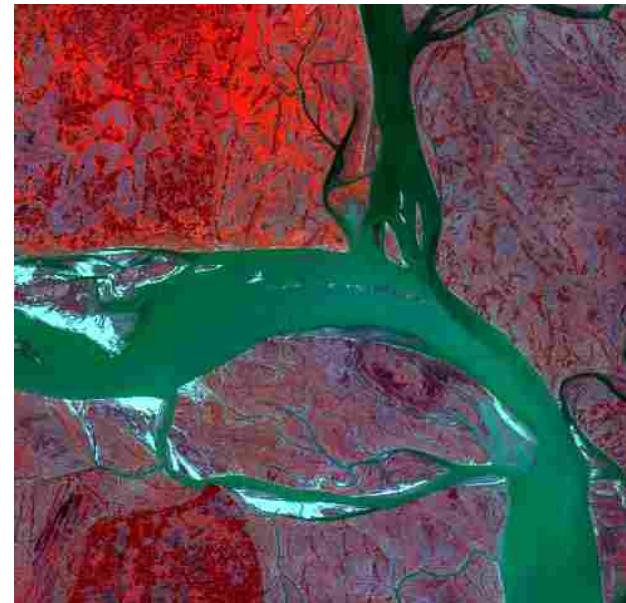
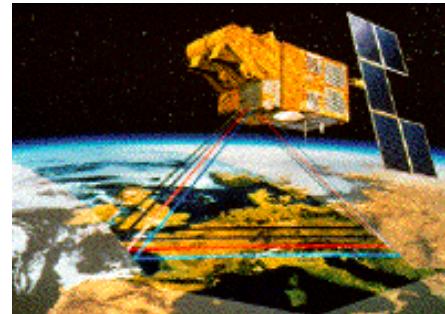
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 - Methods – data sources and data acquisition
 - Aerospace (spatial data)
 - Field-based methods
- Current research directions
 - Geo-Object Based Image Analysis (GEOBIA)
 - Some emerging tools for urban (slum) monitoring

PURPOSE

Aspect	Slum settlement level	City wide level
Spatial level	Object – settlement	Settlement-environs-city
Spatial resolution	Very high (< 1m)	Medium – Very high
Temporal resolution	Annual or more frequent e.g. upgrading projects	1-5 years depending on growth rates and capacity
Spectral resolution etc.	Generally optical (possibly also oblique or terrestrial, LIDAR)	Optical VHR Radar (DLR)
Applications	Regularization of tenure Settlement upgrading Vulnerability assessment	Urban (slum) policy and strategic planning Monitoring (modelling) Topographic mapping Urban growth monitoring Vulnerability assessment



EARTH OBSERVATION (REMOTE SENSING)



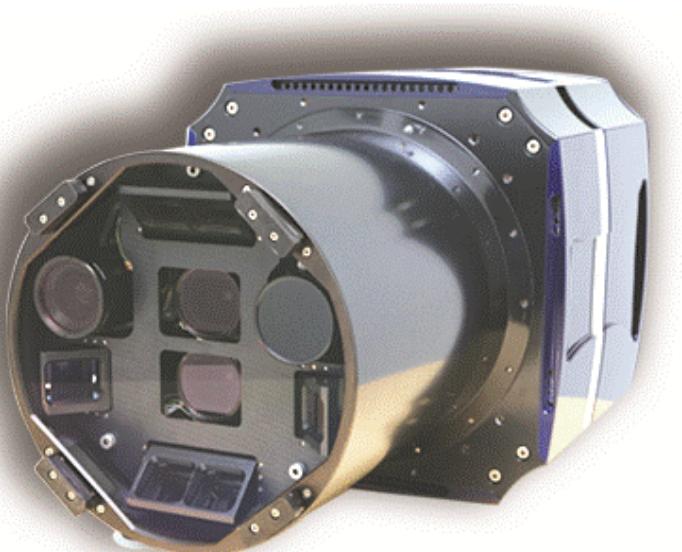
TRADITIONAL AERIAL MAPPING TECHNIQUES



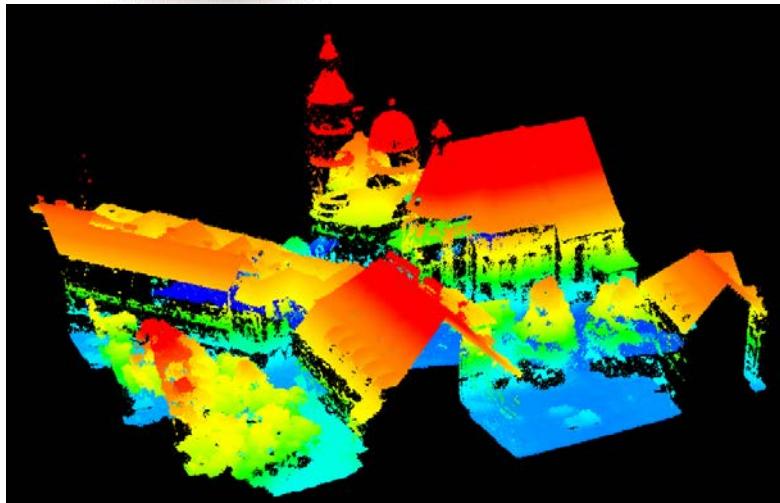
Topographic maps various scales



MODERN DIGITAL CAMERA E.G. ULTRACAM



- Simultaneous vertical and oblique images, Infra red
- Suitable for 3d city model generation via pictometry techniques



AIBOTIX HEXACOPTER MICRO AERIAL VEHICLE



Dense image matching

- Point cloud generation
- 5 cm GSD

Issues:

- Security clearance
- Safety

VHR images in participatory mapping for problem scoping, analysis and planning



NGO-CBO PARTNERSHIPS

E.G. SHELTER ASSOCIATES, SANGLI – MURAD-KUPWAD INDIA

SHELTER
ASSOCIATES

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Home »

Electoral Ward No.1

Govardhan Nagar, Rajvgandhi Nagar is the only two slum in this electoral ward. The area of this electoral ward is 4.57 square kilometers (By Google Earth)

Elected Representative:
Ms. Hipparkar Vimal Pandurang (Vikas Mahaaghadi) is the elected member. Her mobile number is [9421127294](tel:9421127294)

Municipal Administrative Ward: [SMKMC Administrative Ward No.1](#)



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info@shelter-associates.org

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Rajvgandhi nagar Juna Budhgaon Road
Rajvgandhi Nagar (Juna Budhgaon Road) is a slum in Sangli. It was established in 1985 and covers an area of 6049 sq. mts. It has an approximate population of 1125 residing in 225 houses.

[Read more](#)

Govardhan nagar
Govardhan Nagar is a slum in Sangli. It was established in 1996 and covers an area of 1103.93 sq. mts. It has an approximate population of 150 residing in 30 houses.

[Read more](#)

[RSS](#)

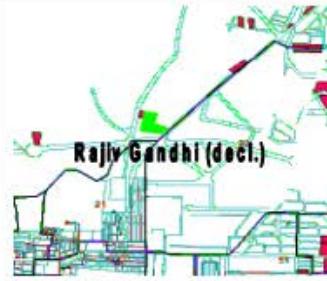
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Credits Privacy Policy



SLUM MAPPING AND ENUMERATION RESULTS SANGLI GANDHI NAGAR.

Sangli-Miraj-Kupwad Municipal Corporation (SMKMC) Slum Surveys 2001
Rajiv Gandhi Nagar, Ward No. 1 Survey No. 133, 134

ADDRESS	Off Juna Budhaon Road, Near Sangli Tasgaon Bypass, Sangli		TOILETS	Earlier the toilet was washed once a week but now it is irregular. The open fields are also used for defecation as the facility is inadequate. Also the approach road to the toilet is very bad and the area around is perpetually slushy. There is no electricity or water storage facility in the toilet block.
		LEGAL INFORMATION		
DECLARED/UNDECLARED		Declared		
APPROXIMATE YEAR OF ESTABLISHMENT		1985		
LAND OWNERSHIP		SMKMC		
NAME OF LAND OWNER		SMKMC		
LAND RESERVATION ON DP		NA		
TENURE STATUS OF SLUMDWELLERS		own the hut		
LOCATION	HAZARDS			
Off Juna Budhaon Road, on flat la	Water logging around the slum is a perpetual health hazard			
GARBAGE	PAVING	NEARBY AMENITIES		
Waste is dumped in and around the slum and no clearance systems.	There are paved lanes within the slum but outside its slushy.	Nearest Hospital Dr.Patil Hospital, Dr. Suryavanshi Hospital Nearest Bus Stop RTO office Nearest School/Colleges Shantiniketan Lok Vidyapeeth in the slum Nearest Telephone Vishrambaug Police Station Nearest Police Station Shivaji Market Nearest Market NGO in slum none Credit/Other savings none		
HOUSES/POPULATION		WATER		
app. No of house-225 approx. Population 1125 Kuccha houses made of tin and wood		There are two taps in the settlement and water is available from 5hours in a day There are also two hand pumps which provide water 24 hours.		
				ELECTRICITY
				There are 18 electric poles cum light poles within the settlement but no telephone poles.

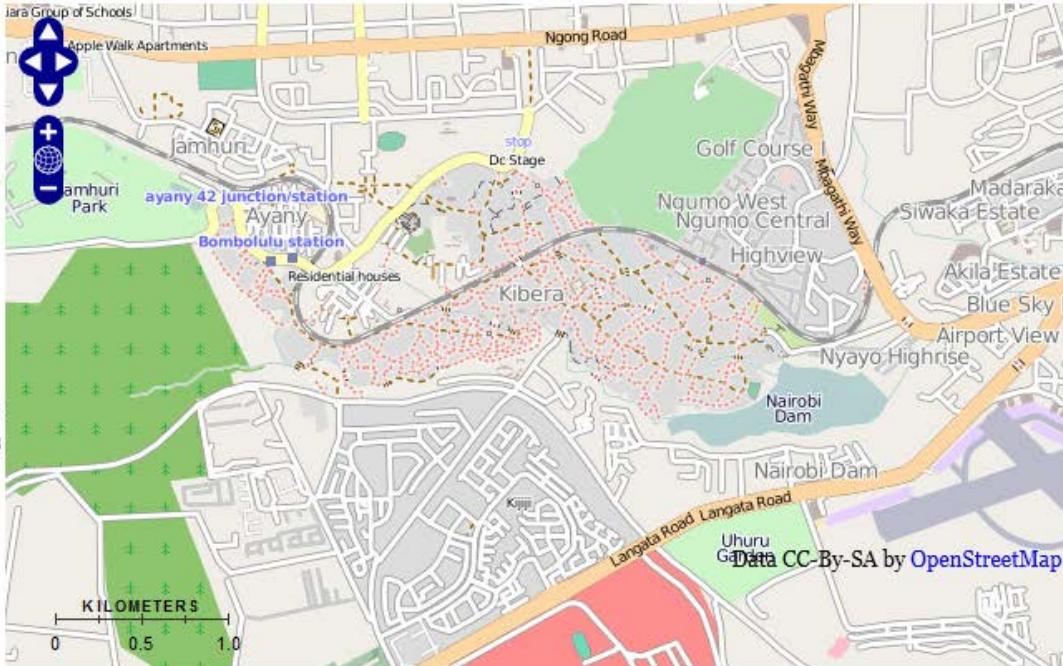
Voluntary Geo-Information (VGI)

<http://mapkibera.org/>

MAP KIBERA

citizen mapping | citizen media

Kibera in Nairobi, Kenya, was a blank spot on the map until November 2009, when young Kiberans created the first free and open digital map of their own community. Map Kibera has now grown into a complete interactive community information project.



programs

Mapping

get involved



Wiki

all our plans

[mapkibera blog](#)

Voice of
Kibera

Kibera News
Network

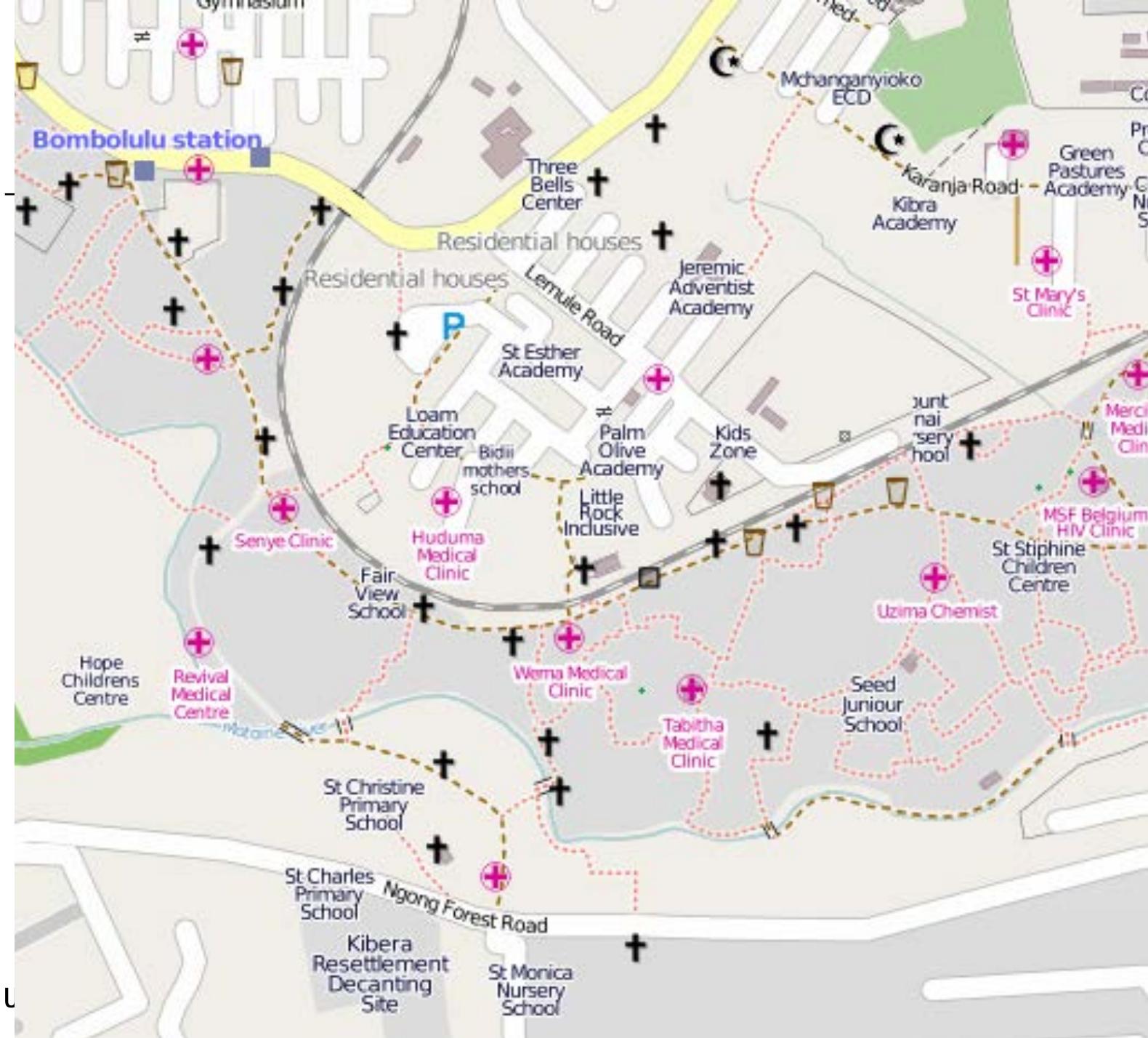
Discuss
on the [Google Group](#) and
[Facebook](#)

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get data

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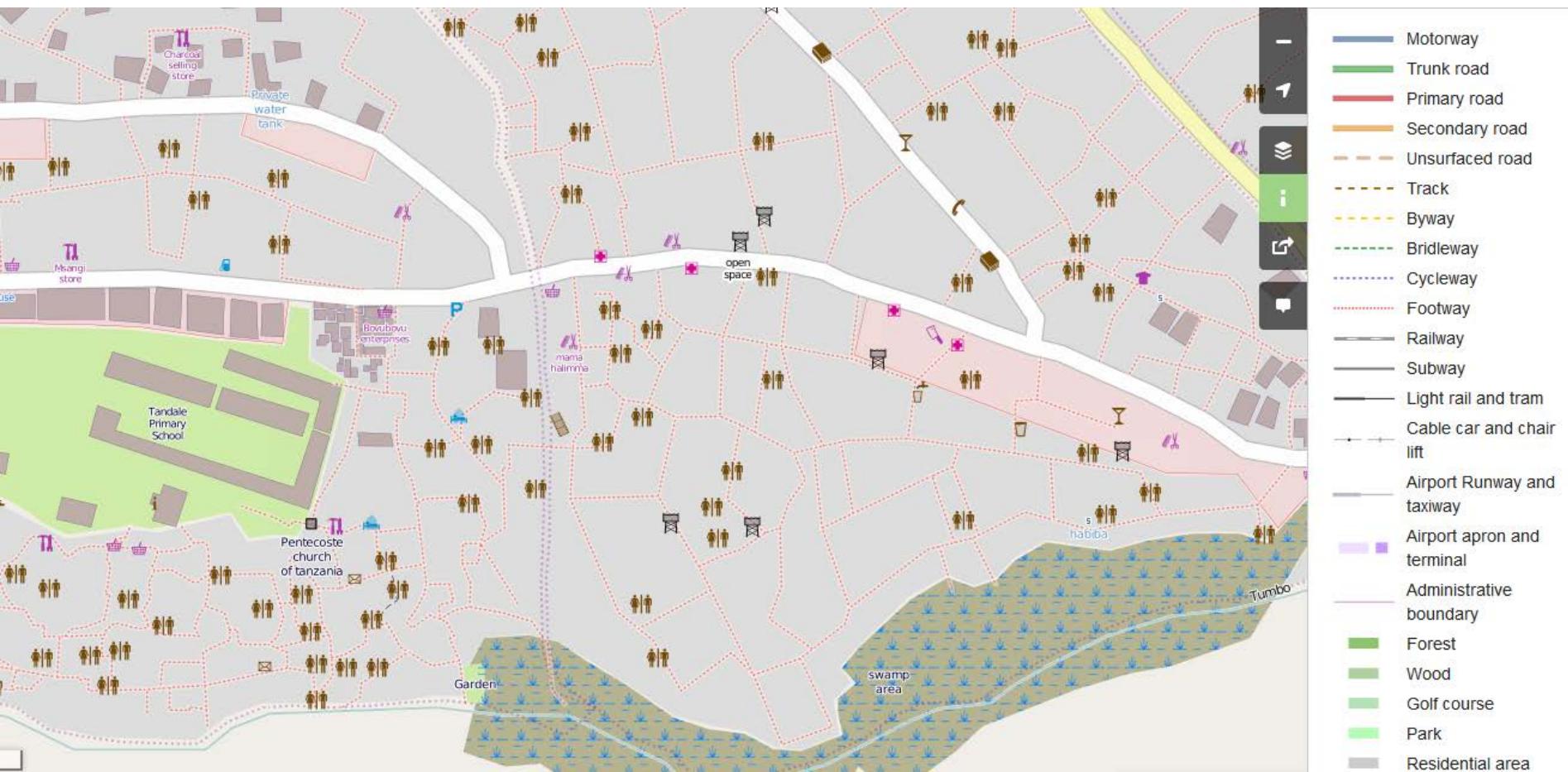
Want to learn more about
Map Kibera? Thinking
about doing similar work?



Open Street Map Tandale, Dar es Salaam Tanzania.



Tandale – detailed view 13 Nov 2013.



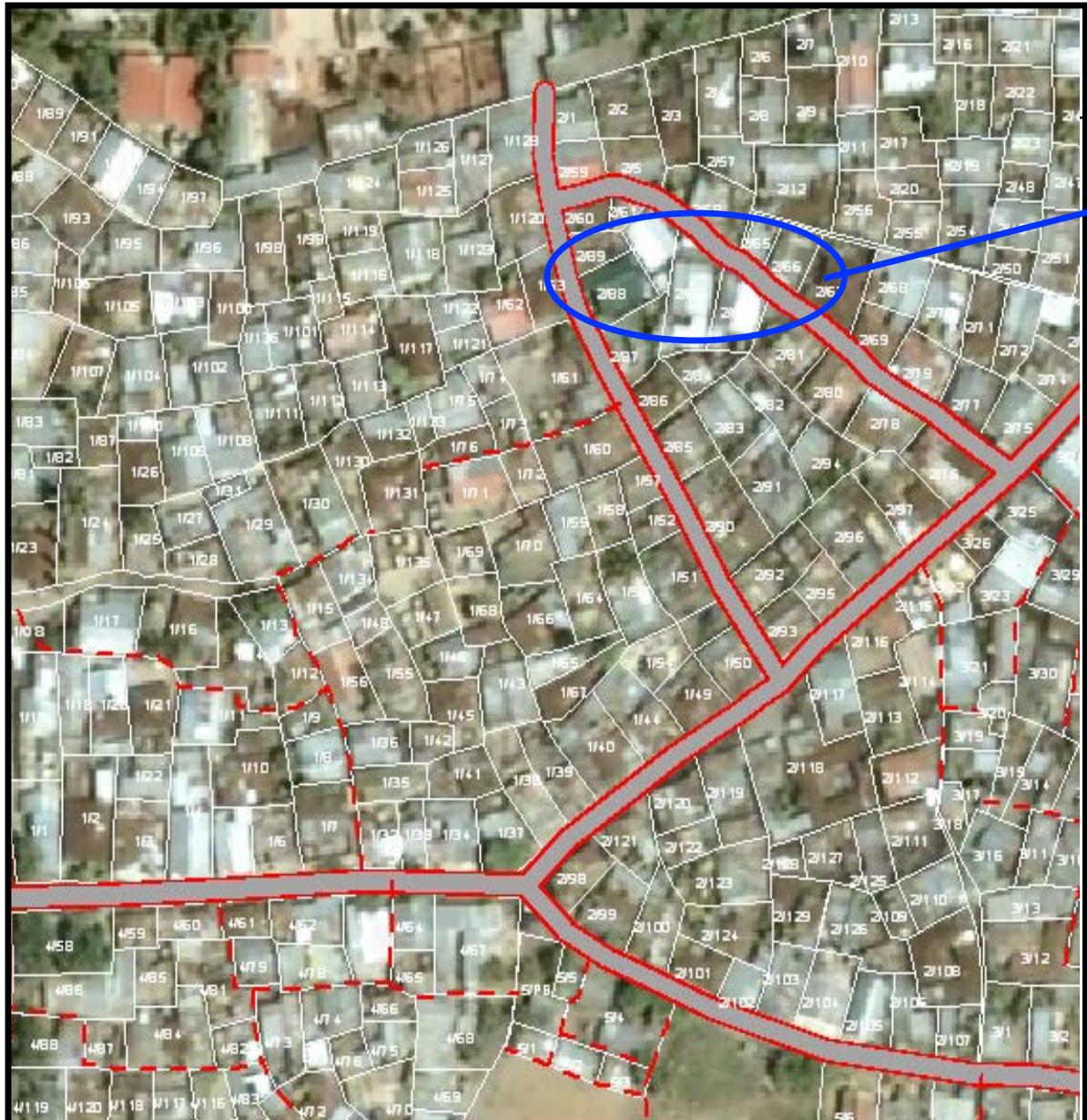
Google Earth: Tandale. Most objects and features have not been digitized on OSM in Tandale.



ARDHI Ministry, Tanzania
DELINERATION AND DIGITISATION OF PROPERTIES FOR
RESIDENTIAL LICENCING



CREATION OF DATABASE



Shape	Polygon
Pid	2/88
PARCELID	KND/MNY/KKP2/88
Wamilikii	Nicholaus Celestine Mtei
Municipali	KINONDONI
Location	KWAKOPA
Ward	MWANANYAMALA
Street	KWAKOPA
Proptaxno	MNY/KKP/20
Houseno	20
Plotdevelo	Jengo Kamiliu
Families	1
Occupants	8
Bedrooms	3
Incomeearn	1
Polutantas	Hapana
Residentst	Mwenye Nyumba
Lrentpermo	0.000000
Landuse	Biasara
Developmen	Jengo Kamiliu
Buildingsv	100000000.000000
Access	Barabara Kuu
Watersourc	Bomba Binafsi
Telephone	Ndiyo
Electricit	Ndiyo
Wastetreat	Zinazolewa na kampuni binafsi
Wastetreat	Zinazolewa na kampuni binafsi
Wastecostp	500.000000

RESIDENTIAL LICENSE

LAND Form No.74

HAL MASHAURI YA MANISPAA YA KINONDONI
SHERIA YA ARDHI YA 1999,
(NA 4 YA 1999)

LESENI YA MAKAZI NA. KND000001

(Chini ya fungu la 23&179)
Ardhi Na. KND/MZS/KMN5/36
Kata MANZESE
Mtaa KILIMANI
Makisio ya ukubwa wa Ardhi ni 340 m²

Halmashauri ya MANISPAA YA KINONDONI kwa leseni hili inatoa KIBALI
CHA MAKAZI kwa: Bibi WEMBO SHABANI MARIJANI

.....
juu ya ardhi kama inavyofanuhiwa kwenye leseni hili kwa masharti
yafuatayo:

1. Muda wa leseni ni miezilimwaka imilaka miwili (2)
kuanzia tarehe 9 mwezi Mei mwaka 2005
hadi tarehe 8 mwezi Mei mwaka 2007
2. Kodi ya Ardhi ya shillingi 2,720.00 Italipwa kila mwaka, chini ya
kilungu cha 23(3) (c). Kiwango hiki kinawezwa kubadilishwa na
Kamishna wa Ardhi kwa mujibu wa Sheria.
3. Matumizi ni: Makazi na shughuli nyingine zozote ambazo zinaendana
na makazi na hazaithiri majani klimazingira.
4. Ujenzi wowote juu ya ardhi hili au umegaji wa ardhi lazima upate
kibali cha Manispaa kupitia Kamati ya Mtaa ambayo ndio
itasimamia kwa karibu utekelezaji wa masharti haya na maendeleo
ya ardhi ya eneo hili.
5. Mmiliki/wamiliki wataheshimu na kuhifadhi haki za njia zilizopo.
6. Muda wa leseni hili unaweza kuongezwa.

Imetolewa leo tarehe 9 mwezi Mei mwaka 2005 na Halmashauri ya
MANISPAA YA KINONDONI.

Laini/Muloni

Jina kamili

Saini.....

Cheo.....

Tarehe.....

Mmiliki/Wamiliki

Jina/Majina

Saini au Doe gumba

(1) Bibi WEMBO SHABANI MARIJANI



(2).....

3).....

IMENAJILIWA TAREHE SAA.....

MIHURI

Kuongeza Muda (Renewal) hadi tarehe:

1.
2.
3.

Main land use and informal settlement map Cairo 2000

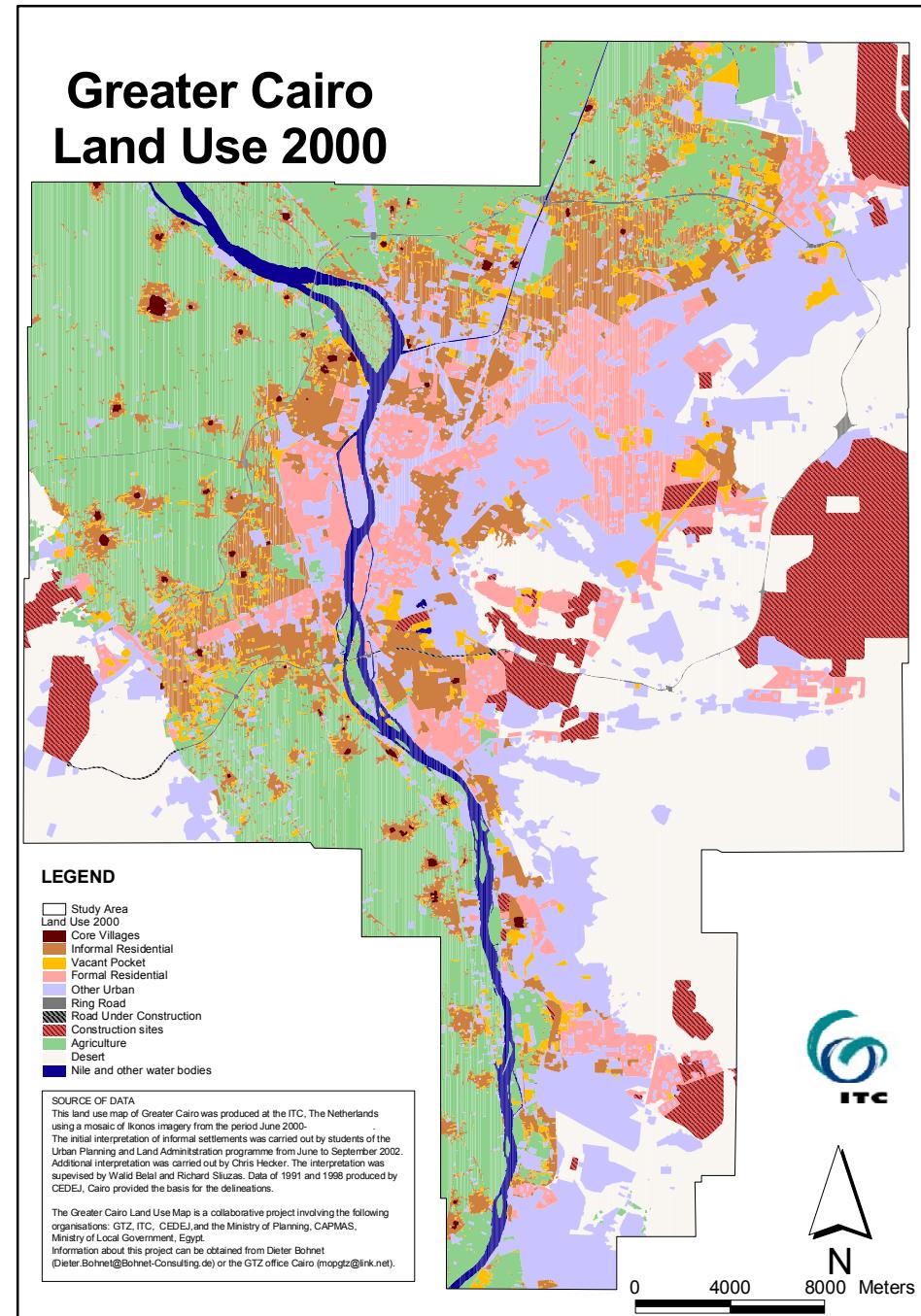
Prepared from Ikonos satellite images

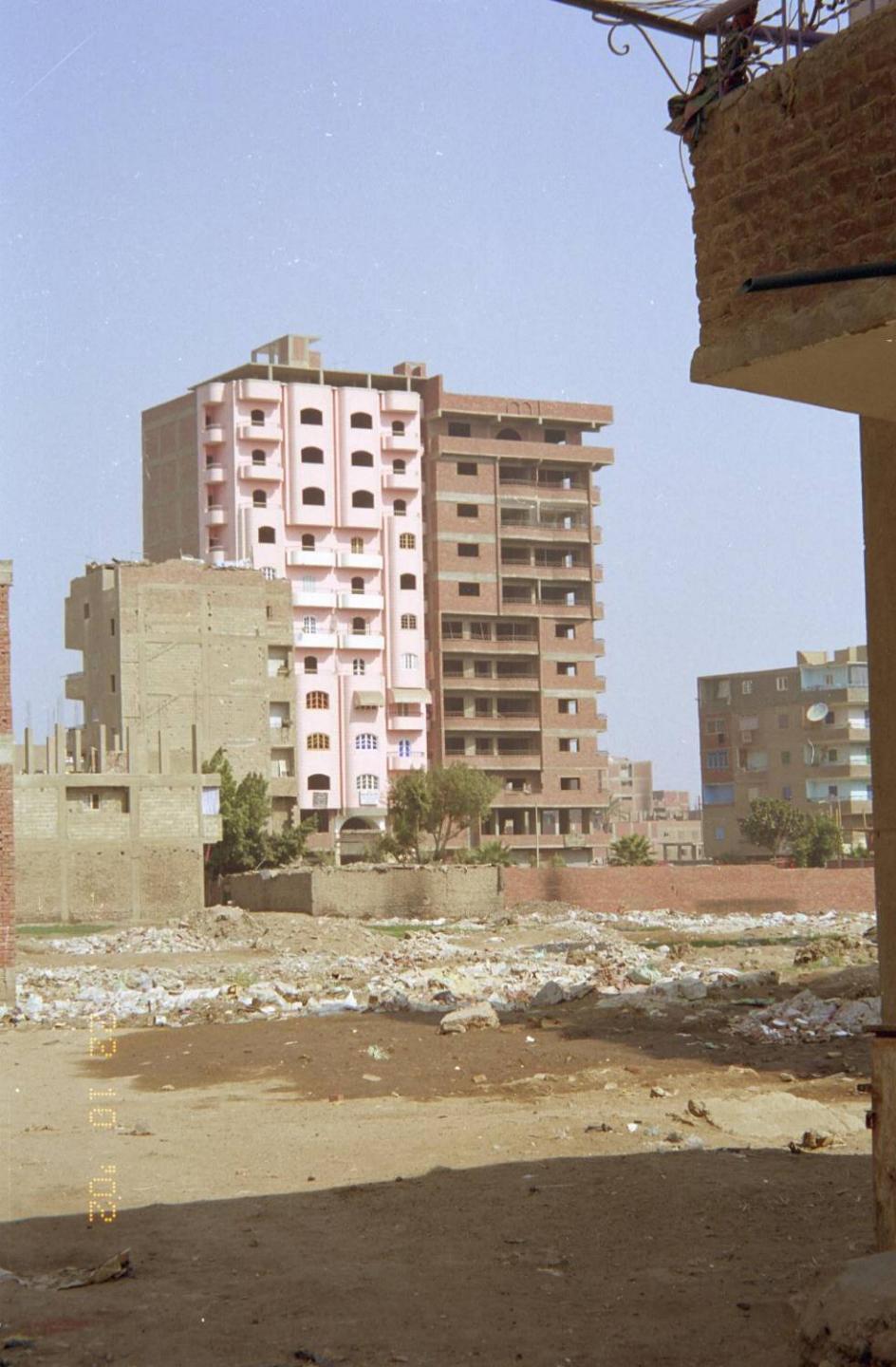
Partners:

- Ministry of Planning Egypt
- GTZ
- Governorates of Cairo
- CAPMAS



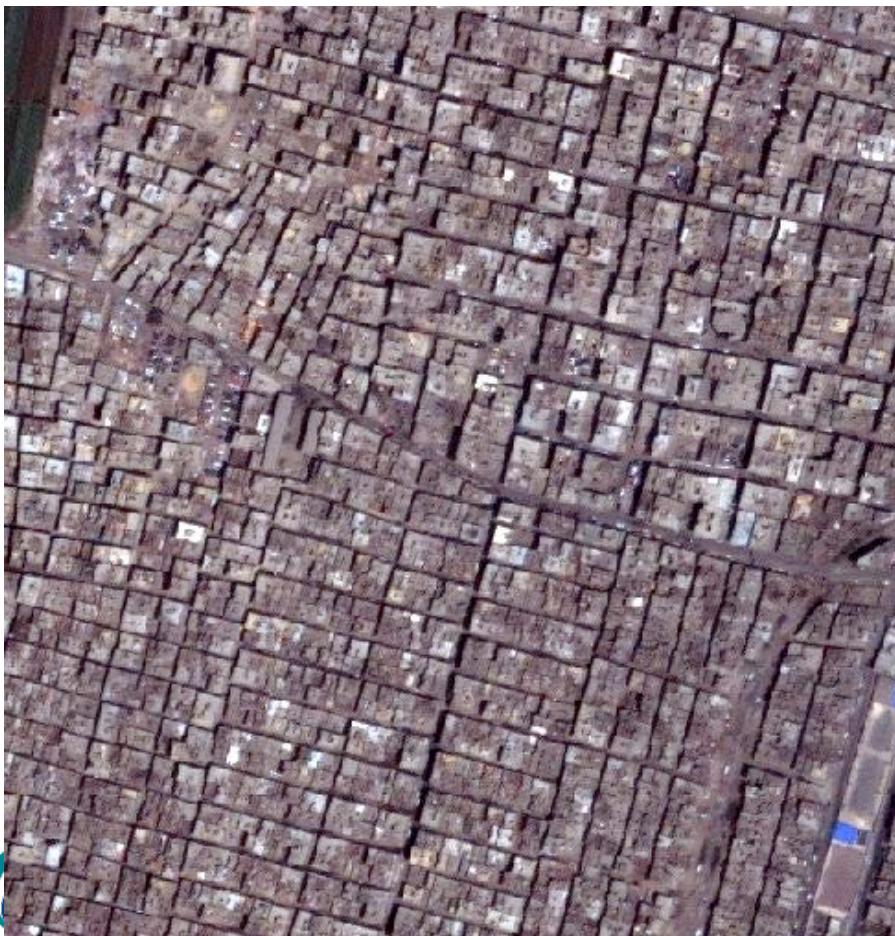
UNIVERSITY OF TWENTE.



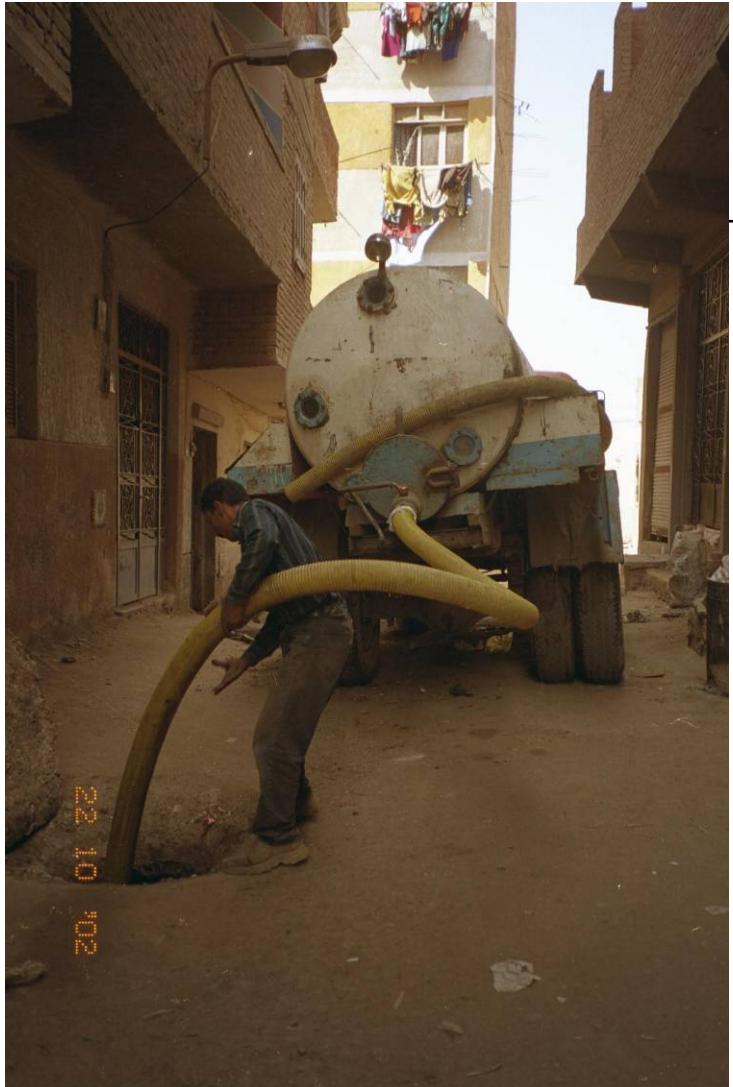


Examples from Cairo (Ikonos)

**Multi-storey high density informal development
without proper sanitation & services**



Former Agricultural land



Cairo land use key
for Ikonos Interpretation

Rules and procedures for group interpretation

Training programme

Quality control

