ZANZIBAR LAND ADMINISTRATION AND REVENUE GENERATION SYSTEM (LARGE) (4620)

FIG Congress 2010
Facing the Challenges – Building the Capacity
TS 10F - Land Taxation and Fiscal Cadastre

Jukka Nieminen
14.4.2010

Zanzibar

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Land area sq. km</td>
<td>1,696</td>
<td>988</td>
<td>2,654</td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>620,957</td>
<td>360,797</td>
<td>961,754</td>
<td>1,100,000</td>
</tr>
<tr>
<td>Population density /sq. km</td>
<td>373</td>
<td>365</td>
<td>370</td>
<td>414</td>
</tr>
</tbody>
</table>
Urbanization 1978-2005

- Aerial photography 1978 → maps 1982
- Early 1980s all urban area was within the boundaries of Zanzibar Municipal Council (Urban District)

Urbanization 1978-2005

- Massive urban development has taken place 1978-2005
- Now the built up area reaches far beyond the Urban District
- Aerial photography 2004-2005
- Digital maps made in-house
Aerial photography 2004-2005

Buildings 2009¹

<table>
<thead>
<tr>
<th>AREA</th>
<th>BUILDINGS TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>STONE TOWN</td>
<td>2,078</td>
</tr>
<tr>
<td>ZANZIBAR TOWN</td>
<td>76,283</td>
</tr>
<tr>
<td>UNGUJA - OTHER</td>
<td>102,261</td>
</tr>
<tr>
<td><strong>UNGUJA TOTAL</strong></td>
<td><strong>180,682</strong></td>
</tr>
<tr>
<td>MKOANI</td>
<td>2,139</td>
</tr>
<tr>
<td>CHAKE CHAKE</td>
<td>6,591</td>
</tr>
<tr>
<td>WETE</td>
<td>6,323</td>
</tr>
<tr>
<td>PEMBA - OTHER</td>
<td>59,337</td>
</tr>
<tr>
<td><strong>PEMBA TOTAL</strong></td>
<td><strong>74,390</strong></td>
</tr>
<tr>
<td><strong>ZANZIBAR TOTAL</strong></td>
<td><strong>254,992</strong></td>
</tr>
</tbody>
</table>

¹ preliminary estimate 1.10.2009

Urban area buildings 93,394
Rural area buildings 161,598

254,992
Multi Purpose Cadastre Pilot - Partners

Land Administration
- Department of Surveys and Urban Planning (DoSUP)
  - Digital map, aerial photos
- Department of Land and Registration (DoLR)
  - Property valuation, Government land lease agreements
- Registrar of Land
  - (Adjudication -> Registration of lands
- Stone Town Conservation and Development Authority (STCDA)
  - Administration, planning, conservation, and services

Revenue Generation
- Zanzibar Revenue Board (ZRB)
  - VAT, hotel levy, stamp duty, land lease collection and monitoring, etc.
  - In the future: property taxation
- Zanzibar Municipal Council (ZMC)
  - Urban services, utilities management, utility charges collection
- SMOLE
  - GIS development
  - Database development

Multi Purpose Cadastre Pilot - Phases

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010
Fiscal Cadastre

Data Entry
Thematic Maps

Internet Browser Thematic Maps: OpenLayers

Tools for map zooming and panning

Scale text and bar

Map legend

Show thematic map layers on/off

X, Y location of mouse
CORE DATA COLLECTION - STATUS

- 97% of buildings done
- SECTION I (Stone Town) 2,069 buildings and 4,638 units entered
- SECTION II (N'gambo area 13 shehias) 5,391 buildings and 10,313 units entered
- Total 7,460 houses and 14,951 units

Adjudication Process

- Part of the joint Adjudication & Registration Team at weekly meeting
- GIS Officer & Demarcation Officer
- Approving the Demarcation Map
- Field check

Adjudication Committee dealing with the claims (with the help of GIS)
ADJUDICATION - STATUS

• SECTION I (Stone Town) 1,683 parcels formed and demarcated
• Adjudication completed for 765 parcels
• Others waiting for Adjudication Committee and 90 day public display

Zanzibar Integrated Tax Administration System – ZITAS

• SMOLE support for system development
• Business plan v 0.1 - complete
• Overall system design - complete
• User interface - complete
• Installation - complete
• Test data input started on VAT collection in Stone Town
• **Property valuation pending**
• Planned start of real use as of March 2010 – status now ?
LARGE - Final results

- Pilot system implemented
- GIS system tested and corrected
- Databases tested and corrected
- Revenue collection method tested
- Staff trained

- Tangible figures available to present to donors for replication of the approach to other urban areas

Challenges

- **Challenges met**
  - Delay of the public announcements (Gazette)
  - Delay in public meetings
  - Delay in naming the officers

- **Future challenges**
  - Political will
  - Resistance among the inhabitants
  - Slow process in adjudication part – overly optimistic expectations
LARGE - Conclusion

- Pragmatic approach – uses existing knowledge level of Zanzibar staff
- Needs heavier tools if real multi-user environment is built (open source GIS is a serious option!)
- **Political will is essential**
IT IS POSSIBLE AND USEFUL TO COMBINE DATA COLLECTION AND DATASYSTEM DESIGN PROCESSES FOR BOTH LAND MANAGEMENT (SYSTEMATIC LAND REGISTRATION) AND REVENUE GENERATION
Background

Zanzibar in figures

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unguja</td>
<td>58,380</td>
<td>77,017</td>
<td>96,938</td>
<td>136,639</td>
<td>2.3 (2.6)</td>
<td></td>
</tr>
<tr>
<td>Pemba</td>
<td>38,087</td>
<td>51,745</td>
<td>70,274</td>
<td>94,244</td>
<td>3.1 (2.1)</td>
<td></td>
</tr>
<tr>
<td>Unguja</td>
<td>85,467</td>
<td>142,041</td>
<td>208,671</td>
<td>380,074</td>
<td>3.6 (4.6)</td>
<td></td>
</tr>
<tr>
<td>North Pemba</td>
<td>72,215</td>
<td>106,285</td>
<td>157,162</td>
<td>186,320</td>
<td>2.6 (2.2)</td>
<td></td>
</tr>
<tr>
<td>South Pemba</td>
<td>92,308</td>
<td>90,014</td>
<td>127,828</td>
<td>175,471</td>
<td>2.4 (2.3)</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>354,815</td>
<td>476,111</td>
<td>640,578</td>
<td>881,754</td>
<td>3.0 (3.1)</td>
<td></td>
</tr>
<tr>
<td>Area per person</td>
<td>0.69 ha</td>
<td>0.51 ha</td>
<td>0.38 ha</td>
<td>0.25 ha</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CURRENT SETUP OF MPC SPATIAL DATA

FACTORY
Data in production

Field survey (demarcation officer)
On-screen digitizing of new buildings and building updates (ArcGIS)
Building & Unit Inventory (Field teams)

input by GIS officer
input by recording officer

STORE
Final data, original copy

ESRI Personal Geodatabase
DBS Server, stand-alone files
Export as shapefiles
GeoServer & OpenLayers Client
Spatial data
MPC Client
GIS and business data browsing, thematic maps
Java Grails WebApp

SERVER
Serving data to applications

GeoServer Datasets
Shapefiles, Orthophotos

DATA IN USE
Data used in daily business processes by different users

ArcGIS (ArcMap) Client
MXD-file with tools and thematic maps

FACTORY
Data in production

Field work, editing on desktop computers

STORE
Final data, original copy

Stand-alone file
- Buildings
- Parcels
- Roads
- Census boundaries
- Cadastral mapsheets

SERVER
Serving data to applications

GeoServer & OpenLayers Client
Spatial data
GeoServer
Datastores
Shapefiles, Spatial data, Orthophotos

DATA IN USE
Data used in daily business processes by different users

ZITAS Client (Java Grails)
works in internet browser, query, edit and browse data, view thematic maps
(easy to use, for everybody)

REVISED SETUP OF ZRB SPATIAL DATA

FACTORY
Data in production
(Field work, editing on desktop computers)

Field survey (demarcation officer)
On-screen digitizing of new features and updating existing features (ArcGIS)
Building & Unit Inventory (Field teams)

input by GIS officer
input by recording officer

STORE
Final data, original copy

ESRI Personal Geodatabase Postgresql/PostGIS
shapefiles spatial data orthophotos

SERVER
Serving data to applications

GeoServer & OpenLayers Client spatial data
GeoServer
Datastores
shapefiles spatial data orthophotos

DATA IN USE
Data used in daily business processes by different users

ArcGIS (ArcMap) Client MXD-file with tools and thematic maps (for advanced users)

Postgresql/PostGIS
GeoServer with Integrated business and spatial (cartographic) data
database views

ZITAS Server
Business logic, integration of business and spatial data

ZITAS Client (Java Grails)
BIRT* reporting server

Business Intelligence and Reporting Tools (BIRT)
### LARGE GIS Software Components

<table>
<thead>
<tr>
<th>GIS Component</th>
<th>Current software</th>
<th>Cheap Proprietary or Open Source Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GIS data editing and management</td>
<td><a href="https://www.esri.com/software/arcgis">ArcGIS</a> (ArcView Licences $1600)</td>
<td>manifold.net (Licences starting from $395)</td>
</tr>
<tr>
<td></td>
<td>With 2gisGIS Extensions ($200) possible to edit data straight from PostGIS without ArcSDE</td>
<td>uDig (free, can edit PostGIS)</td>
</tr>
<tr>
<td></td>
<td><a href="http://geoserver.org">GeoServer</a> (free)</td>
<td>QuantumGIS (free, can edit PostGIS)</td>
</tr>
<tr>
<td>2. Geodatabase Management System</td>
<td><a href="http://www.postgis.org">PostGIS</a> (licences starting from $300)</td>
<td><a href="http://mapserver.gis.st.usf.edu">MAPSERVER</a> (free)</td>
</tr>
<tr>
<td>3. Spatial data server</td>
<td><a href="http://openlayers.org">OpenLayers</a> (free)</td>
<td>uDig (free)</td>
</tr>
<tr>
<td>4. Data visualization (thematic maps)</td>
<td><a href="http://www.google.com/maps">Google Maps</a> (free)</td>
<td>Microsoft Virtual Earth (free)</td>
</tr>
</tbody>
</table>

FIG Congress 2010  
Facing the Challenges – Building the Capacity  
Sydney, Australia, 11-16 April 2010