

FIG Rome WW 2012

An innovative approach for under-resourced municipalities :

A cost-effective geospatial information management system for local government in Nepal

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Institutional Strengthening of Municipalities

Important information related to the Institutional Strengthening of Municipalities in Nepal:

- ❖ ADB project – Technical Assistant contract
- ❖ Eighteen months project (June 2010 – November 2011)
- ❖ Executive Agency: Cowater International and InterGis
- ❖ Three participating municipalities: Butwal, Birgunj and Biratnagar (BBB).
- ❖ Ministry of Physical Planning and Works (MPPW)
- ❖ Ministry of Local Development (MLD)
- ❖ Department for Urban Development and Building Construction (DUDBC)
- ❖ Kathmandu Metropolitan City (KMC)



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Institutional Strengthening of Municipalities

• This ADB project has three main components:

1. Financial management and revenue generation
2. Urban service delivery
3. Development and Institutionalization of GIS-based municipal information system (G-MIS)



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Development and Institutionalization of GIS-based municipal information system (G-MIS)

The two main goals:

1. Implementing a G-MIS for e-government
 - ❖ Accessible from different departments of the municipality;
 - ❖ Friendly/easy to use for end-users;
 - ❖ Display geospatial and tabular information;
 - ❖ Easy to modify and update, but with restrictions;

2. Creating a spatial database
 - ❖ Digital topographic map & satellite image for three cities;
 - ❖ Street addressing system and datasets;
 - ❖ House numbering system and database;
 - ❖ Land parcel datasets (inventory);
 - ❖ Socio-economic database.



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Development and Institutionalization of GIS-based municipal information system (G-MIS)

Challenges:

1. Time and budget;
2. Institutionalize technology in weak institutions;
3. The use of COTS without sufficient budget;
4. Training and implementing IT on a 80% paper-based municipal system.

Obstacles:

1. Lack of digital data
2. Not enough IT equipment
3. Lack of GIS/IT knowledge
4. Motivation only for engineering initiatives (no needs)



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Development and Institutionalization of GIS-based municipal information system (G-MIS)

The approach :

1. Development an hybrid model of Geospatial Municipal Information System (G-MIS):
 - i. COTS: ArcGIS and link with Shangrila Taxation system
 - ii. Web-based system: Open Source MapServer and MySQL
2. Building the geospatial database by using:
 - i. Satellite images for the three participating municipalities
 - ii. Socio-economic survey performed by local NGO and BBB staff
 - iii. Land parcel inventory using scanned cadastral maps
 - iv. House Numbering and Street Addressing codification using digital topographic maps and GIS tools



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Development an hybrid model of G-MIS

The model :



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Building the geospatial database



Birgunj: 25 km²



Butwal: 70 km²



Biratnagar: 60 km²



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Building the geospatial database

Production of digital topographic maps using satellite images for the three participating municipalities:



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Building the geospatial database

Socio-economic survey performed by local NGO and BBB staff

Socio-Economic Survey Questionnaire 2010/11

Questionnaire No. _____ Name of Enumerator _____ Date _____

A. General Information

1. Municipality: _____ Ward No. _____ Street/Tola _____ Zone No. _____

2. Type of Building Use (Indicate the name of the building other than premise)

a. Private b. Government c. Institutional (e.g. school) d. Commercial

e. Industrial f. Health g. Religious h. Public (e.g. shop) i. Other _____

3. Name of the Respondent _____

4. Name of the Building owner (if the respondent is not the house owner) _____

5. Ownership:

a. Own b. Rented c. With rent free d. Other _____

6. If rented, what is monthly rate Rs. _____

B. Description of Building

Year of construction	No. of Floors					Total
	1 st	2 nd	3 rd	4 th	5 th	
Plaster/brick						
Other type of building						
Area of building						
No. of rooms						

7. Construction type of Building

a. RCC Frame Structure b. Cement Masonry

c. Brick masonry/ mud-brick wall d. Wooden Slab wall

e. Temporary construction f. Other (Specify) _____

8. Road access to building

a. Backyard b. Canal

c. Earthen d. From other's property

Width of the road touched by the property building _____

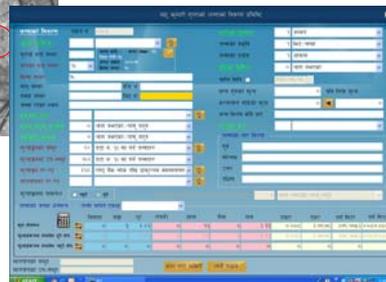
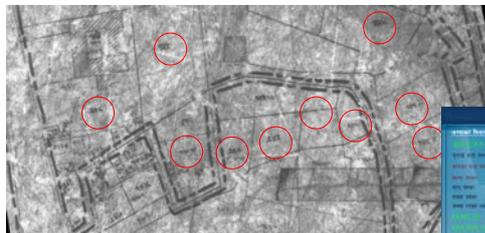


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Building the geospatial database

Land parcel inventory using scanned cadastral maps:

Altogether 615 Maps in hardcopy paper format and print ready image files are produced: Biratnagar – 267; Birgunj – 167 and Butwal - 181



Biratnagar - 18,158
Birgunj - 14,015
Butwal - 5,324



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Building the geospatial database

House Numbering and Street Addressing codification using digital topographic maps and GIS tools:



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Building the geospatial database

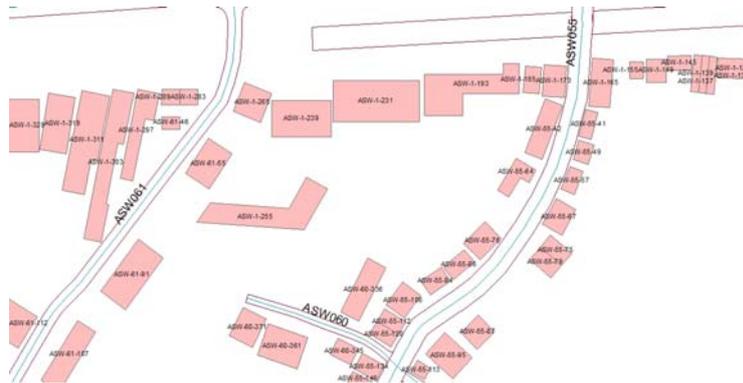
House Numbering and Street Addressing codification using digital topographic maps and GIS tools:

Municipality	NE	NW	SE	SW	CN	Total
Biratnagar	607	650	598	683	NA	2,538
Birgunj	71	148	293	382	259	1,153
Butwal	300	313	471	415	NA	1,499



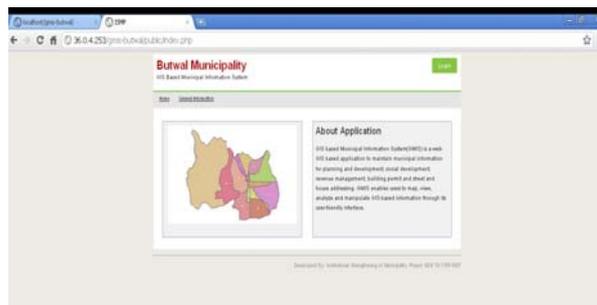
Building the geospatial database

House Numbering and Street Addressing codification using digital topographic maps and GIS tools:



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The results: G-MIS

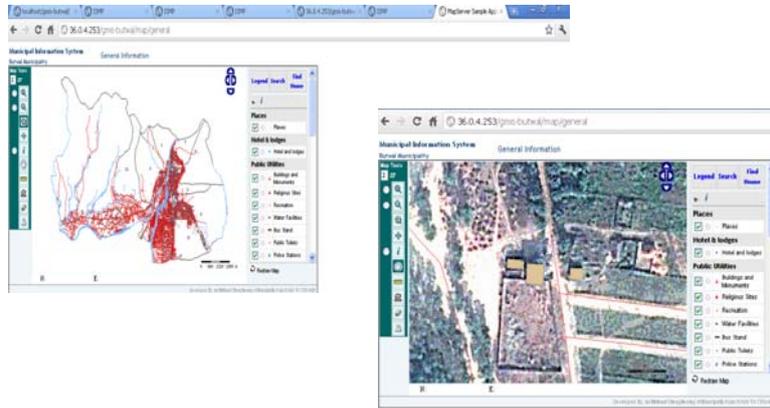


<http://36.0.4.253/gmis-butwal/public/index.php>
<http://36.0.4.253/gmis-birgunj/>



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The results: G-MIS



General Information tools (combine display digital topographic map and satellite image)



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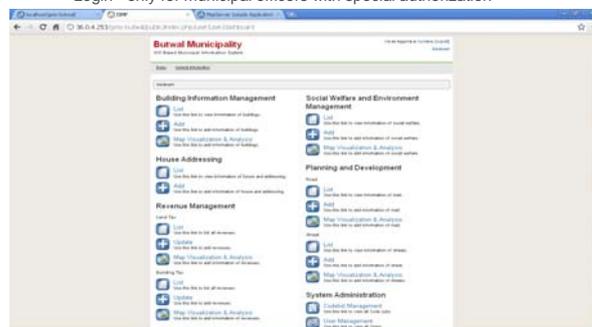
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The results: G-MIS



Login - only for municipal officers with special authorization

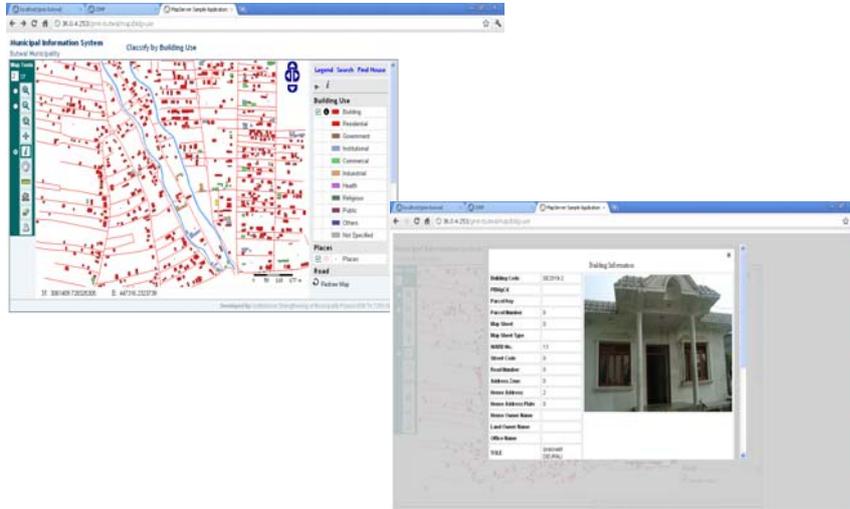


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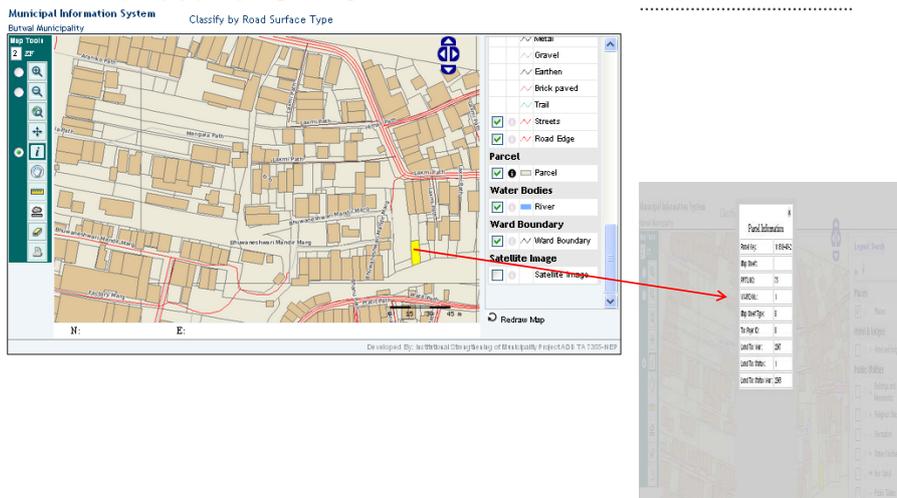
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The results: G-MIS



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The results: G-MIS



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The results: G-MIS



Land Tax Status (Butwal) after linking GIS & Revenue Data



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The results: G-MIS

Butwal Municipality
GIS Based Municipal Information System

You are logged in as SysAdmin. | Logout | Dashboard

Home General Information

Dashboard > User Management

Add User

S.N.	Name	Department	Action			
1	Rohan Masuwa	Planning and Development	Edit	Delete	Edit Permission	Reset Password
2	Sudrit Ma	Planning and Development	Edit	Delete	Edit Permission	Reset Password
3	Ashok Mandarhar	Planning and Development	Edit	Delete	Edit Permission	Reset Password
4	By By	System Administrator	Edit	Delete	Edit Permission	Reset Password

Developed By: Institutional Strengthening of Municipality Project ADB TA 7355-NEP



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Benefits, accomplishment and lesson learnt

- ❖ A successful and on-time implementation and deployment of an extremely simple and user-friendly and inexpensive web-based G-MIS;
- ❖ A simplify data capture mechanisms implemented for daily activities of municipal officers;
- ❖ The effective building capacity at the participating municipalities to handle house numbering and street addressing integrated to land property taxes,
- ❖ Setting and strengthening e-governance capabilities by accessing data and information on all municipal departments;
- ❖ The creation of a computer-friendly process embedded on the former traditional paper-based procedures;
- ❖ The efficient mechanism to build the socio-economic survey database;
- ❖ The creation of GIS mapping to the three participating municipalities and GIS tools to up-date and maintain the integrity of the geo-database



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