UNIVERSITY OF ZAGREB - FACULTY OF GEODESY
Institute of Applied Geodesy; Chair of Spatial Information Management
Kačićeva 26; HR-10000 Zagreb, CROATIA

Development of Land Valuation System

S. MASTELIĆ IVIĆ, H. MATIJEVIĆ, A. RONČEVIĆ, H. TOMIĆ

XXIII International FIG Congress
INTERGEO®
8 – 13 October 2006 - Munich, Germany

Introduction

- **Land** - more or less attractive depending on difference in position, fertility and/or natural resources
- **Valuation** is process of assigning values to land locations
  - Many objective and subjective **valuation factors** must be considered and modeled

2/12

GF, Institute for Applied Geodesy
Chair of Spatial Information Management
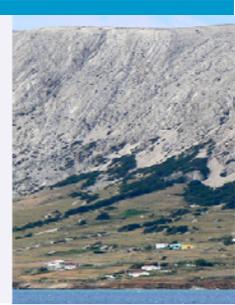
Land valuation system

- Three most commonly used methods of valuation (choice of methods depends on property):
  - Sales comparison
  - Income capitalization
  - Cost approach method

- Possible uses of system:
  - Land market control/support
  - Taxation
 - Land consolidation
  - Land use planning
  - ...

3/12

GF, Institute for Applied Geodesy
Chair of Spatial Information Management

Spatial Data needed:

Physical factors which are the most important for rural areas valuation:
- Land parcels
- Topographic data
  - (dtm, forest areas, water areas, ...)
- Land quality, rain expectancy, average temperature,
- ...

Legal constraints:
- Intended land use, district borders ...

4/12

GF, Institute for Applied Geodesy
Chair of Spatial Information Management
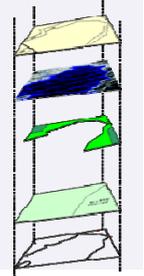
Available data in Croatia

- **Cadastral data** - Classic European system of land cadastral parcels, 3327 cadastral municipalities, Cadastral map sheets ~ 40 % in digital form - currently in process of transition from "Land Cadastre" to "Real Estate Cadastre"

- **Topographical data** - SGA runs project for creation of topographical database - expected to finish in year 2008. (www.dgu.hr)

- **Soil data** - CEA - Development of the Croatian soil monitoring programme (www.azo.hr)

5/12

GF, Institute for Applied Geodesy
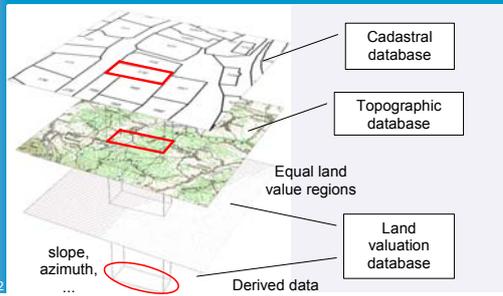Chair of Spatial Information Management

---
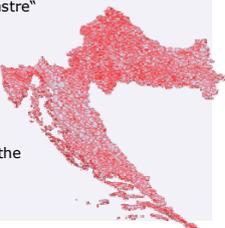
Spatial databases

- Spatial Database Management System (SDBMS) = capabilities of a traditional database management system (DBMS) + special storage, handling and querying of spatial data
  - Support for spatial data in multi-dimensional space
  - Appropriate for large scale system

- Queries supported:
  - Basic operations on all data types
  - Spatial operators

6/12

GF, Institute for Applied Geodesy
Chair of Spatial Information Management

System concept

Cadastral database

Topographic database

Equal land value regions

Land valuation database

slope, azimuth, ...

Derived data

Data used

- Cadastral data - dataprototype of Cadastral district called "Šuma Striborova" (modeled according to project made by Faculty of Geodesy for State Geodetic Administration)

```
SDO_GEOMETRY(2003, 1000001, NULL, SDO_ELEM_INFO_ARRAY(1, 1003, 1),
SDO_ORDINATE_ARRAY(5390078.25, 4904332.12, 5390071.77, 4904305.53,
5390092.54, 4904303.33, 5390093.17, 4904309.22, 5390093.88, 4904313.22,
5390094.58, 4904316.83, 5390095.29, 4904319.26, 5390095.99, 4904321.07,
5390097.09, 4904323.03, 5390098.35, 4904324.99, 5390100.38, 4904327.12,
5390078.25, 4904332.12))
```
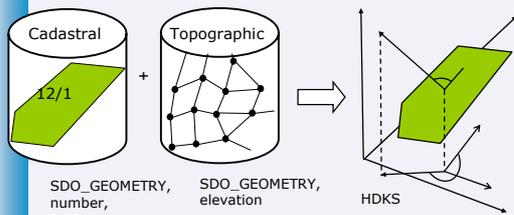
- DTM 3x3" was acquired from the SRTM (Shuttle Radar Topography Mission, http://srtm.usgs.gov)

```
SDO_GEOMETRY(2001, 8307, SDO_POINT_TYPE(13.666833, 44.314, NULL),
NULL, NULL),69
```

Test implementation

State handled spatial databases

Cadastral — 12/1

Topographic

SDO_GEOMETRY, number, area,

SDO_GEOMETRY, elevation

HDKS


Spatial analyses

- Slope and azimuth were calculated and stored for each point

- Ability to answer to questions about some important valuation factors. For example: Which areas are ideally oriented for some specific land use ?

```
select SDO_AGGR_UNION(SDOAGGRTYPE(sdo_geom.sdo_buffer(A.point, 70,
0.8),0.005)) from dtm.dtm A, cadastral_metadata.rsu C where
C.id_area = 335487 and sdo_filter(A.point, SDO_CS.TRANSFORM(C.geometry,
8307)) = 'TRUE' and a.azimuth>120 and a.azimuth<240 and a.slope<30;
```

requirement	Area (%)
azimuth 120-240, slope up to 30	30
azimuth 150-210, slope up to 30	11
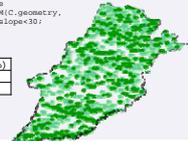
Conclusions

- No large scale investment required for the first phase
- Basis for more comprehensive system
- Determination and assignment of "weight" factors on national level
- Best practice from other countries - harmonization/standardization of datasets (IVS - GN, NSDI)

Thank you for your attention!

Development of Land Valuation System

S. MASTELIĆ IVIĆ (ivic@geof.hr)
H. MATIJEVIĆ (hmatijev@geof.hr)
A. RONČEVIĆ (ante.roncevic@hrt.hr)
H. TOMIĆ (htomic@geof.hr)