

“The Use of Volunteered Geospatial Information and crowd sourcing techniques to improve cadastral survey procedures”



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VGI and Land Administration – New Trends

- Navigation – Leisure time
- Crisis Management (hurricane & earthquake)
- Slum Mapping
- Climate change impact Mapping
- ...
- Land Administration ?

“In the ECA region a very successful land reform and land registration program has been largely completed by people without formal training in cadastral survey. It was often guided by surveyors with the cadastral background who were willing to be pragmatic rather than stuck strictly to historic methods and high levels of accuracy [...] The achievements of the region would probably not have been possible if the cadastral survey profession had existed and insisted on the standard methods and accuracies required in other regions”. (Gavin Adlington, 2011)

The Hellenic Cadastre – Procedures

The AAA Cadastral procedure in Greece:

- Property owners submit declarations to the Cadastral Offices. Owners are expected to recognize their properties on air/ortho photos.
- Interim cadastral tables and diagrams are formed by the Cadastral Surveyors.
- Suspension of interim cadastral data at the Cadastral Survey Offices - Objections submission.
- Amendment of cadastral data.
- Operation of the Cadastral Office.

The Hellenic Cadastre – Progress and Statistics

- The Hellenic Cadastre project **started in 1995**.
- It affects an area of:
~132.000 km² and ~ 37.200.000 property rights.
- Progress achieved:
Completed until 2012: ~ 8.400 km² (6.4% of the total) and ~ 6.800.000 property rights (17%).
 Total Cost = ~ 340M € (approx. ~ 70 € / right).
Under Compilation: ~ 3.100 km² and ~ 7.500.000 rights.
 Aprox. Cost = {212M € + VAT} for the Survey + {42M € + VAT} for the registered rights.
Remaining: ~ 120.500 km² and ~ 22.900.000 rights. (mainly rural areas)

The Hellenic Cadastre –Identified errors

Example: Lesvos Island

Until now:

42.250 registered land parcels.

Numerous objections were submitted by the property owners..

The cadastral agency has recorded 2.500 errors so far. The real number of errors is still undefined; still under editing process.

If errors affect ~ 12.000 land parcels (20-30%), the cadastral survey should be repeated.

By Conventional methodology:

New Cadastral Survey needs 1 year to be declared, 2 years to be implemented, ...costs?

By VGI methodology: 10 volunteers × 15 parcels per day ≈ 3 months (for data collection) + 2 months (for data editing)



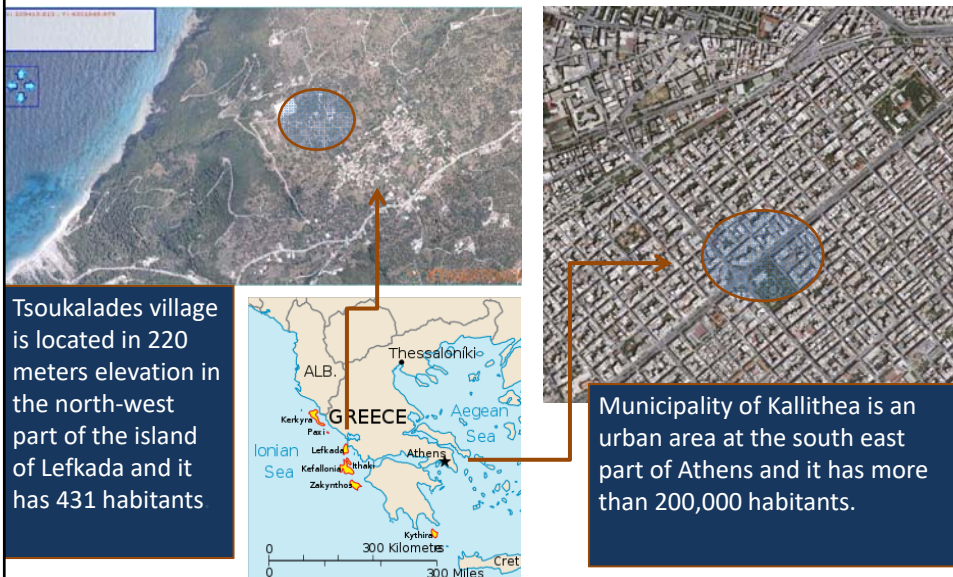
Some areas with large % of gross errors in cadastral surveys.

The Two Practical VGI Applications were made by the NTUA team – General facts

Two practical experiments were carried out in a rural and an urban area of Greece.

- | | |
|--|---|
| <ul style="list-style-type: none"> ▣ Lefkada Island – Rural Area ▣ A weekend experiment ▣ Area of interest: 23.450 m² ▣ 15 volunteers -19 parcels ▣ 3 experts - 1 handheld GPS ▣ Collection of GPS tracks | <ul style="list-style-type: none"> ▣ Athens Urban neighborhood ▣ One Day experiment ▣ Area of interest: 55.750 m² ▣ 7 volunteers - 9 parcels ▣ 2 experts -1 Laptop ▣ VLSO orthophoto ▣ Visual recognition and online design of the cadastral extracts |
|--|---|

The Two Practical VGI Applications - The Areas of Interest



The Two Practical VGI Applications – The volunteers

- Variation in age, educational background, gender.
- All were local residents and property owners in the areas of interest.
- Their motivations: speed up the procedures; eliminate the costs; unblock the market in the areas with errors; participate as active cells of the society.



Results in Rural Area – Lefkada island (I)



Interviews with property owners - the Odyssey of their Property Registration

- The formal cadastral survey began in 1997 and is still uncompleted due to errors.
- The main errors refer to the *location*, *shape* and *boundaries* of the land parcels and to the adjudication of “owners”.
- Property owners had then to submit objections and pay to the private lawyers and surveyors more than 2000€ each in order to prepare the request for correction.
- Property market is blocked for more than 12 years!
- Finally, the cadastral agency fully re-surveyed only a sample of two cadastral units.

Results in Rural Area – Lefkada island (II)



Cadastral surveys of a sample of cadastral units prepared by the:

private cadastral surveyor (in red); when compared to the AAA version it is obvious that there are >30% errors detected.

cadastral agency (in green)-this is the correct (AAA) version ;

Volunteers (in blue) : when compared to the AAA version (right) it is obvious that 2/3 of the boundary points are within the required accuracies; **no gross errors are detected**.

Results in Urban Area - Kallithea

KTHMATOΓIO A.E.



Update: 856,18 m.p.

NO	X	Y
1	213224.50	2130111.50
2	213344.50	2130329.50
3	213424.50	2130111.50
4	213164.50	2130111.50
5	213164.50	2130111.50



- The first phase of the formal cadastral survey has been completed by 2008.
- The second phase has not started yet.
- The Volunteers identified their properties on VLISO orthophotos and they created online cadastral extracts (example left) provided by the Hellenic Cadastre with coordinates. (<http://gis.ktimanet.gr/wms/ktbasemap/default.aspx>).

Conclusions

Strengths of the experiment:

- Noticeable Participation and limited time of Survey
- Willingness to answer sensitive personal information
- No boundary disputes among the owners

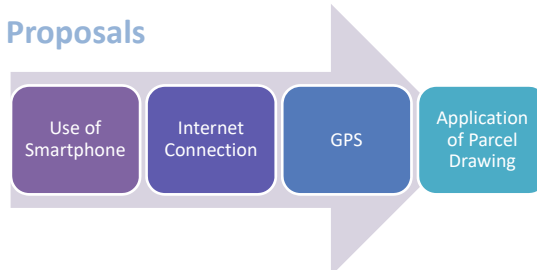
Weaknesses of the experiment:

- Accessibility was limited due to cultivated crofts in rural areas.
- The GPS signal was obstructed.
- Some elder volunteers provided with a handheld GPS were not familiar with new technologies preferring keeping a supervising role.

Proposals

- Draft cadastral diagrams may be compiled in limited time with low cost.
- Hierarchical participation of local authorities, students, citizens/owners is required.
- Next step of our research: improvement of the process by involvement of volunteers in the data editing.

Further Proposals



Thank You!

