Experiences with VGI in challenging circumstances

Mustafa Hameed

M.R.HAMEED@newcastle.ac.uk

Supervised by: David Fairbairn , Suzanne Speak

School of Civil Engineering and Geosciences

Newcastle University

Newcastle upon Tyne, United Kingdom

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1. Aim

Assess the relative usability and accuracy of a range of different methods (Smartphone GPS, Tablet, and analogue maps) for data collection amongst different demographic and educational groups, and in different geographical contexts

Training volunteers on how to collect data

2. Methods of data collection

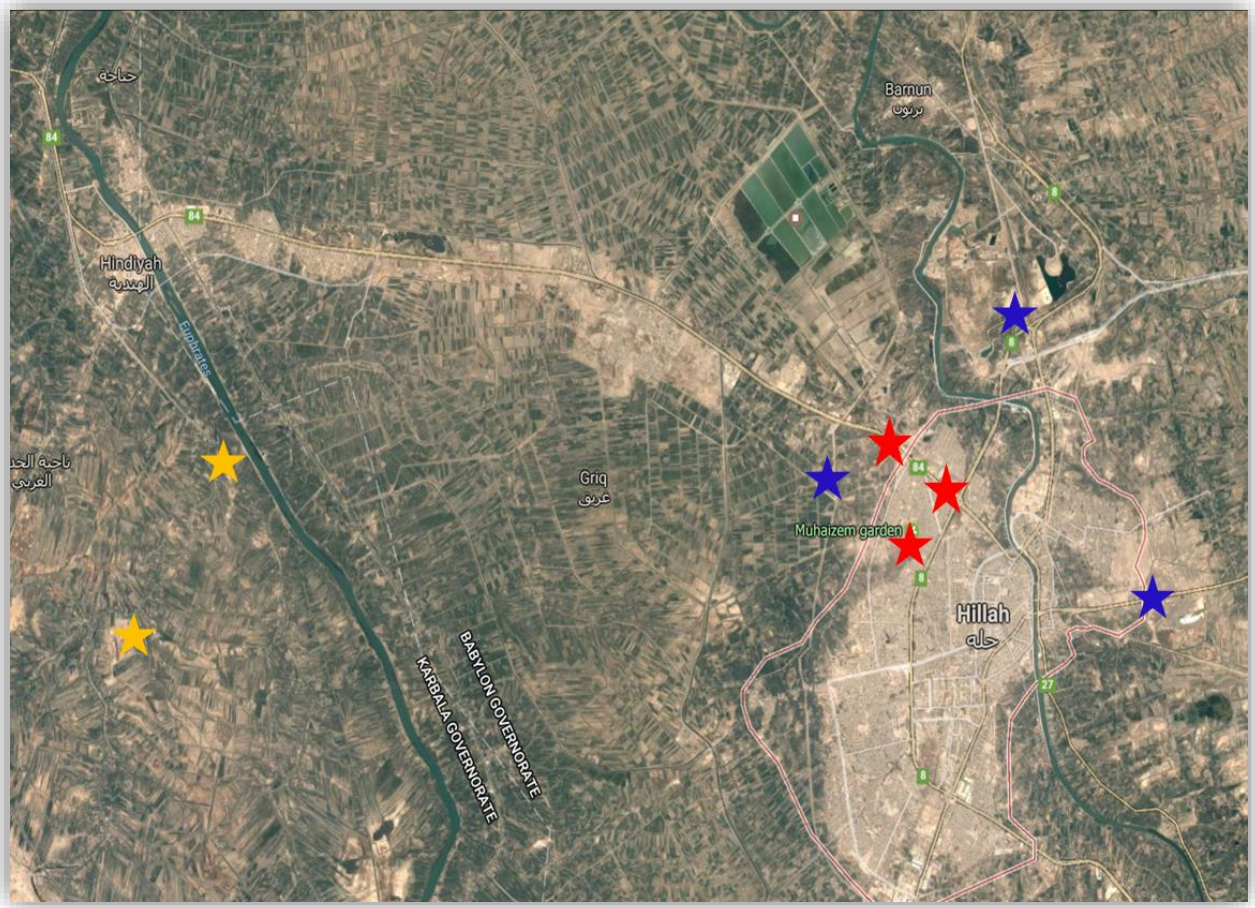
Three methods for collecting data related to land parcel extents, ownership, use, legality etc were set up for local volunteers' use:

1. Smartphone with a GPS app uploaded for locating and attributing land parcel corners;
2. Portable iPad Tablet PC with cadastral map uploaded, and overwriting and annotating capability provided through QGIS;
3. Paper-printed aerial image with clipboard and pencil for demarcation.

Data collection methods

3. Case study location

- The region of Al-Hillah, Iraq
- Three types of locality - rural, peri-urban and urban
- Several specific localities for field work were chosen



Study locations, Al-Hillah, Iraq (Google Maps, 2016)

4. Methodology

- Interviewing professionals
- Accessing existing official data
- Engaging with the community through gatekeepers
- Asking volunteers to capture geometric and attribute data
- Observing volunteers' activities
- Assessing the data captured

5. Activity and outputs

- ***Accuracy results from VGI***

Positional accuracies of the three different methods were compared to the formal/official data collected by professional surveyors in Al-Hillah Land Administration office

Root mean square error (RMSE) for parcel corners for compared datasets

Study areas	No. of points tested	RMSE (metres) cf. official data		
		Smartphone GPS	iPad Tablet	Analogue paper photo
Urban (4 sites)	778	4.364	1.357	2.615
Peri-urban (3 sites)	308	2.933	1.354	2.190
Rural (2 sites)	139	3.23	-	3.41

- ***Completeness***

Total numbers of plots in each case study area were compared

Comparing the number of plots between official and volunteer data

Study area	Official	Volunteers
Urban (4 sites)	1235	2133
Peri-urban (3 sites)	223	285
Rural (2 sites)	80	728

Example

One urban land parcel, believed by the authorities to be a single plot, was shown to have been sub-divided into three separate plots: two used for housing and the third further divided into several small shops

- ***Other attribute characteristics***

Disagreement in validating ownership data, by consensus, was low across the three different zones

Verifying ownership data by crowdsource agreement

Study area	No. of plots tested	No. of plots with inconsistencies in named owner	Percentages of error
Urban (4 sites)	200	9	5%
Peri-urban (3 sites)	150	5	3%
Rural (2 sites)	80	2	2%

'Crowd-sourced' ownership data, obtained from evaluations by multiple individuals is reliable, and can be used for validation and for informing the official Land Administration organisation

6. Volunteer preferences for the method of data collecting

Relative preferences for 'high tech' methods (Smartphone/GPS for picking up coordinates, iPad for digital boundary demarcation) and 'low tech' methods (ordinary pen to delineate plot boundaries on paper printed satellite/aerial image, topographic map, sketch map)

Preferred method of data collection by volunteers in different communities

Areas	GPS smart Phone	iPad Tablet	Analogue paper photo
Urban	10	17	14
Peri-urban	17	7	13
Rural	13	0	14

7. Motivation for future VGI contributions by volunteers

Engagement with VGI and willingness to do more?

Collecting VGI in different communities in future

Study area	Yes	No	Not sure
Urban (4 sites)	35	3	3
Peri-urban (3 sites)	31	2	4
Rural (2 sites)	26	0	1
Total	92	5	8

8. Conclusion

- Opportunity for volunteers to participate, regardless of level of education or experience
- Difficulties in social, political, environmental circumstances
- Varying technologies and categories of VGI data collection suit different types of people, in varying geographical contexts
- Encouraging levels of accuracy and completeness of VGI data have interested official Land Administration authorities searching for ‘fitness for purpose’ for their systems