There is no App for that – Ardous fieldwork under mega urban conditions

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1 Big City Struggle

This paper describes the second of three fieldwork studies in the context of the research project "Grassroots GIS. Development of low cost mapping and publishing methods for slums and slum-upgrading projects in Manila", financed by the School of Design and Environment, Department of Architecture, National University of Singapore (NUS). The project follows from preparatory work and the first investigative fieldtrip by the authors in 2010, which had been published the year before (REKITTKE & PAAR, 2010). The research is conducted in combination with special landscape design studios in the context of the NUS Master of Landscape Architecture programme. These studio projects are related to and organised in cooperation with the Philippine grassroots movement Gawad Kalinga (GK). The mission of Gawad Kalinga – meaning *to give care* – reads as follows: "Building Communities to End Poverty". The method is simple: "Land for the Landless. Homes for the Homeless. Food for the Hungry" (GK, 2010). Beneficiaries work hand-in-hand in *bayanihan* (Filipino term for teamwork and cooperation) with GK volunteers in building the infrastructure and structures of the community (Fig. 1). The *kapitbahayan* (association of GK homeowners) composed of the beneficiaries themselves, take on multiple roles and undergo various leadership trainings. The beneficiaries learn to take ownership of their community and are empowered to help themselves and help others (REKITTKE & PAAR, 2010).

Fig. 1: NUS MLA students and staff during a volunteers' building day in GK Telus Village, Manila 2011 (photos: Nur Syafiqah).

In 2010 the students worked on the topic *Needle in a Haystack Gardens – Manila*, focussing on designs of urban gardens or garden elements that contribute to a healthy environment and to improved living conditions in the selected GK slum-upgrading project areas, denoted as *villages*. The students had been asked to specialise on productive forms of gardens that can provide precious food for the table (REKITTKE et al., 2010). This year, 2011, the 'designs for the real world' of the students (PAPANEK, 1985/2000) will focus urban farming and livelihood ideas for two other selected GK villages in Metro Manila – *Concepcion Village*, Barangay Buayang Bato (administrative district) in Mandaluyong City and *Telus Village* in Quezon City.

Being able to invest research energy and money into the informal parts of the often chaotic context of mega urban Metro Manila means both a blessing and a curse. A blessing because slums and slum-upgrading projects are the most unsurveyed and untraceable parts of mega-cities, constituting white spots on official maps and planning materials – which makes them excellent and challenging scientific targets. A curse because the mandatory fieldtrip actions can be affected by some loony unpredictabilities. This time we had bad luck. During a city tour – beyond our GK research areas – one of our students had been assaulted by two hooded motorcycle bandits, who finally shot him in his legs two times, injuring him seriously. This happened in a corner of the city Moloch, where no mobile network can be reached, no ambulance is available and no public transport is offered. The dramatic story had a good end thanks to many helping Filipinos. The student underwent a six-hour surgery and could travel home with us after our ten-day fieldwork. We are aware of handling a scientific paper and this kind of detail might be unusual in such a text. The description of the incident is not meant as an emotional anecdote but rather provides a realistic glimpse on the unspeakable conditions that we try to work in – the routine environment for more than 16 million stalwart people in an *endless city* (BURDETT & SUDJIC, 2007). It was not only the extreme urban environment that we had to struggle with, also our technical equipment, tools, applications and our methods caused us some serious headache during this fieldwork. We are conducting this research parallel to the guidance of a design studio with a social background, a tightrope walk with bottlenecks. Therefore we regard this article rather as a report and reflection on experiences, problems, necessities and ideas than a perfect document of research success or fulfilment. Most findings of our Grassroots GIS approach (REKITTKE & PAAR, 2010) can just be generated via ardous fieldwork, only be *perceived through the feet* (INGOLD, 2004). Under these conditions learning by doing remains indispensable, disappointment inescapable.

2 Technical Armament

2.1 GK Village Anomaly

Slums are usually places where detailed fieldwork with the aid of costly equipment is virtually impossible. High-capacity cameras inclusive associated equipment, sophisticated surveying tools, expensive phones or the like are out of place. People and communities in slums constantly monitor their personal environment and they usually inhibit any attempt of outsiders to gather revealing data or information. These extreme places are representing hard-fought territory, the daily struggle for survival causes rough customs and those who tune in to criminal activities understandably don't like to put their cards on the table – one of the reasons for the low rate of documentation or mapping of slums (DAVIS, 2007). Referring to this the Gawad Kalinga villages feature a positive anomaly. Although they form just tiny islands in the sea of vast urban slum areas, they offer a largely safe and practicable working environment for our purposes. To become dwellers in the GK housing projects, the beneficiaries have to form strong communities and swear off any form of crime, violence, drug abuse and other negative behaviour (GK, 2010). Living in and owning their new houses unequivocally changes the lives of these people and they impress everybody by acting friendly, cooperative and social. Seeing the children in these

communities creates hope and confidence, they have a realistic chance to get to know the promise of a civilized childhood, parental care and school education. Only this context allows our detailed analysis, design work and research activity in the megacity slum and slum-upgrading environment. Thus we can apply some necessary fieldwork technology, not being afraid to finally leave the place without this equipment.

2.2 Equipment Pool

Slum-upgrading work of non-profit organizations like Gawad Kalinga faces small or diminutive budgets, thence Grassroots GIS tries to build on unexpensive technology, easy or free access to applied tools, geodata and georeferenced design data as well as open source, open standard and cost-free software and data storage possibilities (REKITTKE & PAAR, 2010). In 2010, a low cost GPS device and an ordinary digital compact camera had represented our only technical equipment. This year we invested some research money in a slight rearmament. In addition to the GPS device we bought iPhones 4, equipping them with some free or low cost applications ("Apps") for our fieldwork. Also a better and primarily faster digital reflex camera found its way into our luggage. This upgrade was related to three estimations: 1) High-capacity smartphones are congesting the markets worldwide and will find their way even into the hands of the poor. In our research we are trying to anticipate this inevitable development; 2) We constantly have to cater for not being outdistanced and compromised by the common technical progress; 3) Smartphone and 'App'-developers lay claim to deliver this legendary *all-in-one*, the *jack of all trades* or what Germans mock as 'Eierlegende Wollmilchsau'. Even the quarter of fulfilment of this promise would accommodate us very much with our intended grassroots approach.

Fig. 2: The complete fieldwork equipment: digital reflex camera (l.), pen and paper (m.), iPhone 4 inclusive selected Apps (r.).

Currently we are not planning to fundamentally expand our equipment pool, any arms race would thwart our basic claim. Many things could be imagined regarding other additional handheld devices for the fieldwork – like a laser telemeter for example, but we don't plan to come off our chosen path. We regard our research as design-oriented basic service, paving the way for subsequent outdoor design inclusive planting design, integrating 2D and 3D geospatial data and tools for the purpose of landscape design activities. We are not trying to

poorly copy the work of professional geodesists, who definitely have better methods and tools. We are searching for a way to become independent from non-existent maps of informal urban settlements, testing and applying common technology to use it as fast and effective do-it-yourself geometer tools. Main aim remains the development of a toolbox and user-generated geospatial content process that supports mapping, storing, interactive design, disseminating, and interactive visualizing of landscape architectural interventions in the context of urban informal settlements (REKITTKE & PAAR, 2010).

2.3 Employed Mobile Apps

From more than 300.000 available iPhone Apps (APPLE.COM, 2011) we have chosen the modest number of seven Apps for four topical chapters of the fieldwork:

- **Surveying and Mapping**

  1) 'MotionX GPS' (pro version, 2.99 S$ = Singapore Dollars). According to the developer, 'MotionX GPS' is the leading GPS App for the iPhone and iPad. "Over eight million iPhone or iPad users have chosen MotionX" (MOTIONX.COM, 2011).

  2) 'GyroSurveyor' (freeware). According to the developer, 'GyroSurveyor' "(…) can help you estimate distances within visual range with the help of camera and orientation sensors on your device. It uses data from orientation sensors and the camera image to determine 3D coordinates of the object you selected and then give you the distance from the object to you or another object" (IDEAMATS.COM, 2011).

- **Photography**

  3) 'ProCamera' (2.99 S$), a powerful, award-winning tool, which might currently be the most sophisticated camera tool for iPhone.

  4) '360 Panorama' (1.99 S$), a tool for realtime panorama creation (APPSTORE, 2011).

  5) 'Camera' (Apple iOS), the inbuilt standard camera App of the iPhone.

- **Sound recording**

  6) 'SoundCloud' (freeware), an App which "(…) lets you easily access, browse and listen to the sounds shared to you while you're on the road and away from your computer" (APPSTORE, 2011).

- **Colour check**

  7) 'Color Set' (2.99 S$), a digital colour chart, based on the German RAL colour systems 'RAL Classic' and 'RAL Design'. The human eye is able to distinguish about ten million colour shades. "Since 1927, RAL has (…) standardized, numbered and named the abundance of colours. These standards are easily understandable and applicable – worldwide" (RAL.DE, 2011).

After some pre-fieldtrip testing of 'MotionX GPS Lite', the restricted but costfree version of MotionX GPS, we decided to rely on MotionX GPS during fieldwork. The App offers an *OpenStreetMap* download feature and caches the map tiles. This way users can avoid expensive data roaming on site. SoundCloud, in contrast, requires Internet access to store the recorded data, which can cause immense costs under international roaming conditions.

2.4 Brothers in Arms

We might be two of the few academics in the field of landscape architecture who dedicate their research and design work to informal settlements in the megacity context, but all in all we are only two scattered foot soldiers in the vast world army of *volunteer geographers* (GOODCHILD, 2007; OVER et al., 2009), exploring untrodden paths of urban public realm and (re)mapping the world on own initiative. In Manila we met two of these activists, Emmanuel Sambale – a professional geographer and GIS expert, and Rally de Leon, a businessman, running a messenger service in Manila, desperately missing exact and non-ambiguous delivery addresses of many clients. It was them who established the contact, identifying us via our year 2010 *OpenStreetMap* uploads of GK village maps of *Baseco* in Manila City, and *Espiritu Santo*, part of Sitio Pajo in Quezon City. They are volunteer mappers since more than five years, and they joined us during our mapping activities in *Telus Village*, Quezon City. When they usually do their fieldwork, they celebrate 'mapping parties'. The social part of such parties begins, when all data of a site are collected, processed and uploaded – the same day. They came well equipped – laptop with wireless connection, Garmin GPS devices, laser telemeter and a separate compass. The telemeter was an indoor device, a 'by-product' of the on-going private house building activity of Rally de Leon, and not really suitable for outdoor conditions and distances (Fig. 3).

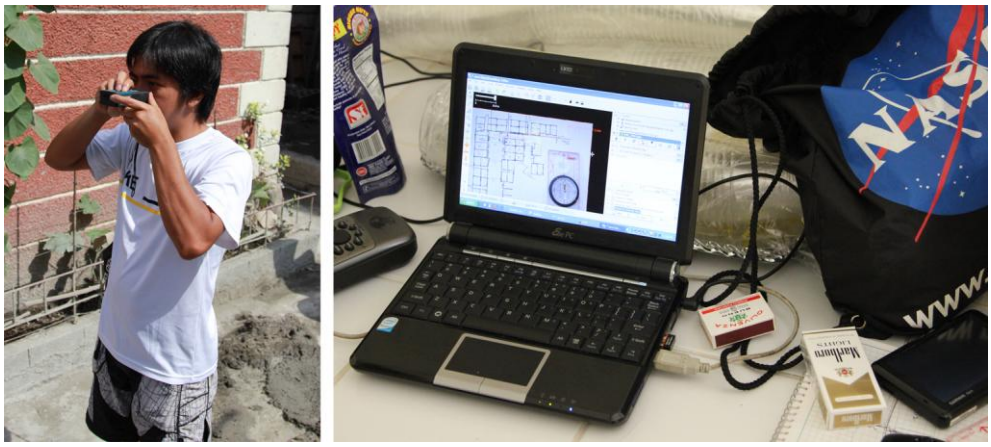

Fig. 3: Volunteer as well as professional geographer E. Sambale (l.) with indoor laser telemeter. Advanced field equipment for editing and upload of data on site (r.).

Their compass came into operation when using a detailed hand-drawn ground plan of our NUS students to merge it with GPS tracks and a rough ground sketch of their own. The compass was positioned on the paper map, digitally photographed, loaded into *Java OpenStreetMap Editor* (JOSM) and scaled and rotated with the JOSM plug-in *Piclayer*. The GPS data were edited in Garmin's desktop software *MapSource* and imported into JOSM. After a manual calibration of the laser telemeter data, GPS data and the paper maps, they generated an on-screen fair drafting in JOSM, added useful attributes and were ready to upload the new map puzzle piece. They abstained from the immediate upload – presumably because their ambition had been egged by our vivid exchange of knowledge. The principle of

gathering, processing and upload of all data on one day and onsite, offers an essential advantage: Mistakes or doubts can immediately be checked *in situ*. After their session in Telus Village, our Filipino colleagues went straight to the next nearby GK village. GK officials showed vivid interest in the collective mapping and we are pleased that we could initiate a meeting of local actors for a good cause – breaching the isolation and addresslessness of the GK villages by publishing the neighbourhoods via online maps at the public platform *OpenStreetMap* (OSM). The uploaded material of SAMBALE and DE LEON (Fig. 4) forms a small step of progress concerning our work for GK. They included some samples of the tiny GK house footprints – each footprint is about 18 square metres. This detailed scale just could be reached by including the hand drawings of our MLA students, pure GPS mapping doesn't allow this specificity (Fig. 5).

Fig. 4: Before (l.): Unmapped and untraceable GK Village Telus. After (r.): Uploaded mapping (screenshot osm.org, Feb 1, 2010) inclusive samples of house footprints (Sambale & de Leon).

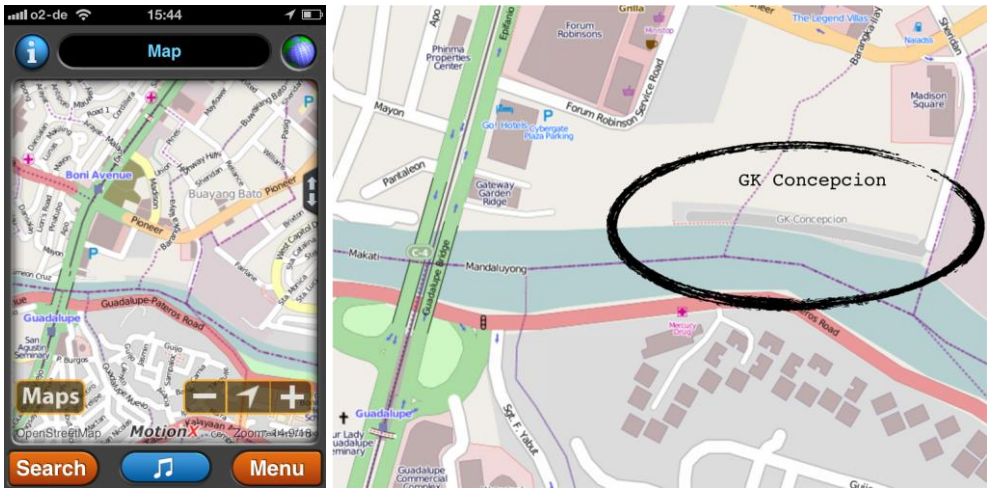

Fig. 5: Before (l.): Unmapped and untraceable GK Village Concepcion. After (r.): Uploaded mapping (screenshot osm.org, Feb 1, 2010) exclusive samples of house footprints (Rekittke & Paar).

Displayed at highest OSM enlargement level, we realise that the house samples are nearly to small for such maps, but they are visible. Telus Village doesn't have streetnames so far, but house numbers had been assigned recently and could be attributed in OSM. This final step would mean: Telus Village is findable, people can be visited, mail can be delivered – mission completed.

3 Research in Progress

Little by little one goes far. In 2010 we worked on GK village *Espiritu Santo*, one of our study sites "where the streets have no name" (REKITTKE & PAAR, 2010). In the meantime streetnames had been assigned and we were able to update the data on OSM. No records of these new street names were available, only in the field we could check and document them (Fig. 6). Beside the street name signs, the photo shows the successful implementation of a simple green wall, proposed by one of our MLA students in 2010 (REKITTKE et al., 2010).

Fig. 6: Updated mapping (Rekittke & Paar) of street names, a new multi-purpose hall and new preschool in GK Espiritu Santo (screenshot osm.org, Feb 1, 2010)

Because detailedness and enlargement level of the used mapping platform are limited, we are searching for an adequate way to bring geo-referenced photography into play. There

seems to be an App for that. '360 Panorama' allows – via an ingenious real-time *panorama painting technique* – to create fast and effective geo-referenced 360^0 views despite the ubiquitary hindrances and stumbling blocks in the informal environment, which render all too systematic and exact photo documentations virtually impossible. It had been a false assumption (REKITTKE & PAAR, 2010) to think that a tripod could help to deliver better photo material, tripod positions could be calibrated, shooting angles be fixed and picture intervals be unitised. No chance for such finicky fiddling on squatter or ex-squatter territory. We tag our results as *Google Street View* surrogate (Fig. 7), a low-budget, self-made alternative to *Street View*, wildly handmade but sufficient and bridging the waiting time for the Google camera vehicle that never arrives.

Fig. 7: *Google Street View* surrogate. Panoramas of GK Telus Village and adjacent slum neighbourhoods, recorded with the 360 Panorama App (Rekittke & Paar).

This photographic material can be placed in Google Earth or Biosphere3D (PAAR & CLASEN, 2007) – OSM doesn't provide this feature yet – communicating the reality and development of GK villages worldwide. As visible on the panoramas (if not displayed in black and white), colour plays a crucial role in the GK concept. Slums are dark, sometimes pitch-black. The GK movement tries to guide the poor back to the light and paints all new houses in bright colours. To document these colours, we used the App 'Color Set' (Fig. 8).

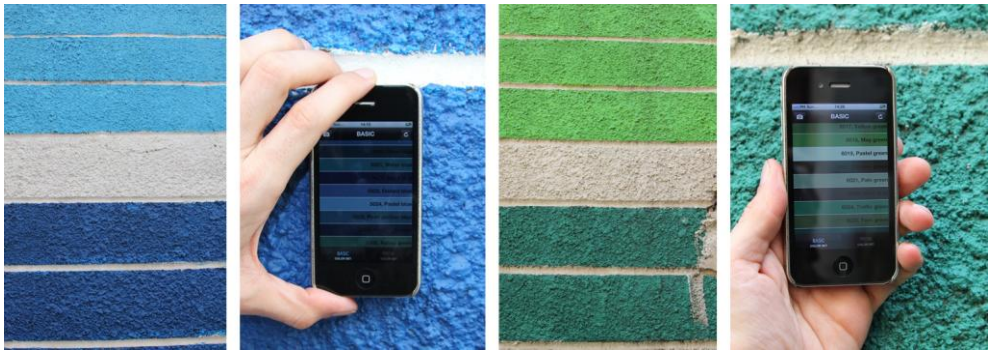

Fig. 8: Application of iPhone App 'Color Set' for documentation of the facade colours in GK Telus Village, Manila.

'Color Set', a digital colour chart based on the German RAL colour systems 'RAL Classic' and 'RAL Design', can be used in the field to identify the exact tint of the GK house walls. Such detailedness constitutes a theoretical extreme of grassroots GIS, the finest graininess that we could generate. We think that this goes to far concerning our purposes, but we had to test it.

4 Wish List and Feedback Forum

4.1 Longed-for Tools

- 'MotionX GPS' is a powerful App, but the scattering of the integral iPhone GPS receiver is very high. The segmentation and narrowness of the informal city doesn't correspond to such a GPS signal variance and vice versa. An external GPS antenna could make the difference.
- Our Filipino OSM volunteers reported that they sometimes use such external antenna in the urban context, mounting it on a bamboo stick to receive GPS signals of higher precision. When mapping in areas of high housing density they recommended to set some reference points in open areas neighbouring these density zones, to have a possibility of averaging potential discrepancies. We consider to include this into our future fieldwork.
- When using iPhone App '360 Panorama' we repeatedly thought that an App with a comparable comfort and simplicity for the creation of linear (long and flat) panoramas would be extremely helpful for analytic work in the context of informal settlements. The '360 Panorama, App is one of the most simple and efficient fieldwork tools we found so far, but it should feature a better exposure compensation for strong light contrast in outdoor situations. And it would be good – especially for landscape architects – if the App could record a bigger visible portion of sky and ground.
- In addition to geo coordinates and compass data, the camera pitch should be saved as metadata in the EXIF standard, which is not the case in the tested iPhone 'ProCamera' and 'Camera' Apps.

- Tightness and density of informal settlements afford an ultra-wide-angle lens to allow photographing of complete facades – maybe unaccomplishable for an iPhone.
- 'GyroSurveyor' ought to measure distances simply on a flat level surface but we couldn't get it work properly. An inbuilt laser would be a useful sensor for future iPhones.
- An App that combines and synchronizes photography with a voice recorder would be expedient.
- OSM map services and also MotionX currently provide a zoom scale of maximal 18. This is very limiting if building footprints of about 18 m^2 – common in most GK villages – shall be displayed. We would like to map and display even tiny 'square foot gardens', which contribute to the aimed self-sufficiency of GK villages.
- Why not finishing this chapter with some utopianism: Megaurbanity necessitates an *Urban Chaos App*, able to record the overwhelming mixture of multiple noise, stench of excrements and waste, extreme air pollution, numbing exhaust fumes and other 'abstract environmental pollution' (SPEED & SOUTHERN, 2010). Under this muser category also falls an App that could deliver image-based 3D reconstructions, generated in real-time during fieldwork walk-throughs. It is the time-consuming data post-processing, which breeds such hallucinations.

4.2 Sisyphean Struggle

It remains an unanswered question of principle, how much information and how many data should be recorded for Grassroots GIS. Comparable with the side effect of digital photography – too many pictures to be viewed – our grassroots approach seems to demand resolute self-censorship and healthy braving the gap. Getting lost in detail would be ill-advised. As long as digital data gathering and processing takes significantly more time than detailed pencil sketching in the field, proper scepticism concerning our digital tools and methods persists. Yet a basic catalogue of data that we need seems to become apparent. The iPhone is a smart shenanigan and the flood of new Apps will lead to new ideas of using them. But although the overall number is overwhelming, not all too many Apps seem to be suitable for mapping activities and spatial design work preparation. This is reassuring at least.

5 References

Apple Store, 2010. Accessible under: http://www.apple.com/iphone/apps-for-iphone/

Rekittke, J. & Paar, P., 2010: *Grassroots GIS – Digital Outdoor Designing Where the Streets Have No Name*. In: Buhmann, E., Pietsch, M. & Kretzler, E. (eds.), Reviewed Proc. of Digital Landscape Architecture 2010 at Anhalt University of Applied Sciences, Wichmann, Heidelberg: 69-78.

Rekittke, J. et al., 2010. *Logbook Landscape Architecture no.02*. Berlin: epubli.

Burdett, R. & Sudjic, D. (eds.), 2007. *The endless city: the Urban Age Project by the London School of Economics and Deutsche Bank's Alfred Herrhausen Society*. New York: Phaidon Press.

Davis, M., 2007. *Planet of slums*. London: Verso.

Gawad Kalinga, 2010. *Building Communities to End Poverty*. URL: http://www.gk1world.com.

Goodchild, M.F., 2007. Citizens as Sensors: The World of Volunteered Geography. *GeoJournal*, 69, p.211–221.

Over, M, Schilling, A., Neubauer, S., Lanig, S. & Zipf, A., 2009. *Virtuelle 3D Stadt- und Landschaftsmodelle auf Basis freier Geodaten*. AGIT 2009. Salzburg, Austria, 10pp.

Paar, P. & Clasen, M., 2007. *Earth, Landscape, Biotope, Plant. Interactive visualisation with Biosphere3D*. Proc. at CORP, 12th International Conference on Urban Planning & Regional Development in the Information Society, Vienna, p.207-214.

Papanek, V., 1985/2000. *Design for the real world. Human ecology and social change*. Chicago: Academy Chicago Publishers.

Speed, C. & Southern, J., 2010: *Handscapes – Reflecting upon the Use of Locative Media to Explore Landscapes*. In: Buhmann, E., Pietsch, M. & Kretzler, E. (eds.), Reviewed Proc. of Digital Landscape Architecture 2010 at Anhalt University of Applied Sciences, Wichmann, Heidelberg: 164-172.

Ingold, T., 2004: Culture on the Ground: The World Perceived Through the Feet. *Journal of Material Culture*, 9 (3) p.315–340.