Workshop Review: Grassroots Mapping and DIY Industrial Monitoring[1]

The 112th annual meeting of the American Anthropological Association was held from November 21-25 at the Hilton in Chicago, IL. Presented under the theme "Future Republics, Current Engagements," the schedule of events bore testament to the conferences scope and depth. The activities ranged from panels addressing cutting edge topics from across the discipline; informative roundtables discussing pressing ethical, theoretical, and methodological issues; invited talks by world famous researchers; professional development workshops; aesthetically pleasing and analytically rich poster presentations; job and publishing fairs; and society galas. While the panels, invited lectures, and poster sessions provided a more formal atmosphere, the intimacy of the roundtables and workshops allowed for more interactive experiences. Several workshops, including the one reviewed here, provided basic training in new fieldwork methods and technologies. In this review, I hope to impart the content of the workshop and the different ways to apply it to fieldwork situations, pedagogical activities, and within applied or "active" anthropology.

On Friday afternoon, I attended a workshop along with a dozen other researchers hosted by the Culture and Agriculture subgroup entitled "Grassroots Mapping and DIY Industrial Monitoring: Low Cost, Open Source Techniques For Community-Academic Collaboration In Environmental and Cultural Anthropology."[2] In a small conference room on the Hilton's fourth floor, the presenter Shannon M. Dosemagen, from the non-profit Public Laboratory for Open Technology and Science, introduced both herself and the organizer Sara Wylie from the Northeastern University and Public Laboratory. The participants then introduced themselves and their interests in attending. The sociocultural anthropologists were largely interested in using this tool from an applied or action perspective to empower local populations in their advocacy for social and ecological justice. My own interest lay in the need for an inexpensive and easy to use platform for constructing areal maps for collaborative research efforts between researchers and populations for its potential to expand upon the traditional dialectic of fieldwork.

The aim of the workshop was to give an overview of how to construct hardware and use software to create high definition areal maps for little cost. The method was developed through collaborative research between anthropologists and communities to monitor operations associated with the mining, oil, and gas industries. For example, "the method was used during the BP oil spill in the Gulf of Mexico by communities to create a public archive of maps documenting damage from the spill."[3] The Public Laboratory emerged from this research, and develops "low-cost open source hardware and software for Do-It-Yourself (DIY) environmental monitoring."

The experience was broken down into three sections. The first section dealt with explaining the process and constructing the hardware. The second section involved testing the hardware in the field. In the concluding section, we learned how to use the software and were introduced to other emerging technologies and their use within the growing online community. After familiarizing the group with the technique and philosophy behind Grassroots Mapping, we were split into groups around stations dedicated to constructing one part of this simple camera "rig" which would then be attached to the helium balloon or kite.[4] The equipment consists of a large Mylar balloon, a tank of helium, one two-liter plastic soda bottle, 1000 feet of string

wound around a spool, rubber bands, duct and clear packing tape, and a cheap digital camera with a continuous shooting mode. The rig is very easy to construct and provides safety and stability for the camera while it is in the air.[5] After constructing our rig, we were instructed on how to set up the camera so that when fixed inside the harness, it will automatically begin shooting when turned on.

In the second section, we moved in a group to a small park opposite the hotel where we set up the helium tank and inflated the balloon. After turning the camera on the balloon is slowly let up into the sky and seconds it was floated several stories up. The group moved in a straight line towards the edge of the field where we then retrieved the balloon and turned off the camera. Once back inside the conference room, we uploaded the pictures while Sara introduced us to the proprietary software with which we could construct our map. The browser, called MapKnitter, is an open-source and copyleft program that helps sort and piece together the disparate captures from the camera. The process of making these composite images is known as known as orthorectification or georectification and is distinctly different than satellite maps created by automated aerial imaging systems. While the composite images lack the higher precision in spatial telemetry of satellite maps, they can be higher resolution because the sensor is only a hundred feet in the air instead of in orbital space. To ensure the best images for the mosaic, the photos are sorted through a subprogram called Mapmill, which features a crowdsourcing function to help choose photos that are in focus and suitable for the map.[6]

In the final section of the workshop, after we had reviewed the mapping software's results for our test, we discussed the impacts of the technology through its use by protest groups, researchers, and community advocacy organizations. A number of papers have been published on the impacts of the technology with myriad approaches and foci. These impacts range from general shifts towards a democratization of science, to cost-effective implications for assessing environmental damage more rapidly and scrupulously than satellite technologies.[7,8] The research promotes future avenues for geospatial activists promoting crowd-sourced information to apply low-cost mapping techniques. Already, different groups of activists have used grassroots mapping techniques to create current and detailed representations of geographic space at little cost. The method is especially suited to crisis mapping and other situations where conventional mapping lags behind changing conditions, or when political and economic conditions prevent populations from accessing or participating in the creation of geospatial information.

In the public sphere, balloon mapping has been used as a media tool by protest groups around the world. For example, a student protest in Madrid used the technology to broadcast a live stream of the protest from the air via Youtube, which spread their demands of lower costs and better quality to hundreds of thousands of viewers.[9] In addition to media uses, ecological monitoring by local groups has had an impact on a number of legislative and legal cases corresponding to an array of problems. From post-Sandy New York City cleanup to monitoring mining and oil operations, the technology allows access to a technocratic realm otherwise inaccessible to most populations.

Sara also introduced us to two other technologies, or "hacks," using cheap digital cameras and simple equipment. The first, a low-cost tool for detecting Hydrogen Sulfide using film canisters and undeveloped film, would be of interest to anthropologists studying oil and gas extraction, industrial farming operations, and landfills. The second, low cost spectrometry using an

altered camera to capture photosynthesis rates as infrared light, would be of interest to anthropologists working on environmental justice issues, such as oil spills, and chemical contamination from oil refining and chemical manufacture. The concluding group discussion covered these tools can help build partnerships between academics and public groups to "address environmental health issues through advocacy, remediation, and increasing public and regulatory awareness."

The potential application of these technologies is high, both because of their low-cost simplicity and the extensive network of researchers and enthusiasts that have formed an online community around the development and use of grassroots mapping. The application within advocacy and protest movements fosters agency and strengthens the social connections to technology and science which are largely underdeveloped. The technologies provide researchers with powerful tools that can be applied in a wide variety of subfields. For example, aerial archaeological surveys could be undertaken without airplanes or access to high-resolution satellite imagery. Researchers and planners could also make up-to-date maps of urban areas or environmental features with high rates of change. Beyond the potential uses posed in these brief examples, the greatest possibilities of these developments lies in the burgeoning online community surrounding their development and application.

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Endnote

1 Photos of session available at http://www.flickr.com/photos/zevphotos/sets/72157640112911163/

2 http://aaa.confex.com/aaa/2013/schedule/index.cgi?password=*cookie&action=schedule&page=browse#view=Session9768&srch=

3 http://www.pbs.org/idealab/2010/05/diy-mappers-offer-remarkable-images-of-gulf-coast-oil-spill132

4 http://archive.publiclaboratory.org/download/Grassroots_Mapping_English_2_0.pdf

5 http://publiclab.org/wiki/pet-bottle-rubber-band-rig

6 http://publiclab.org/wiki/mapknitter

7 Dosemagen, S., with M. Lippincott, L. Barry, D. Blair, and J. Breen 2013 "Civic, Citizen and Grassroots Science: Towards a transformative scientific research model." In *Accountability Technologies - Tools for Asking Hard Questions*. Offenhuber, Dietmar, and Katja Schechtner eds. Vienna, New York: Springer.

8 Warren, Jeffery and Stewart Long 2010 "Neogeographic: Approach to Inexpensive Oil Spill Mapping." *Directions Magazine*. http://www.directionsmag.com/articles/neogeographic-approach-to-inexpensive-oil-spil-mapping/131048

9 http://grassrootsmapping.org/2011/08/balloon-mapping-in-santiago-seeing-protests-from-a-different-perspective/