Chapter 1

Introduction

1.1 Defining Grassroots Mapping: tools, practices, or community?

Exactly what makes up the Grassroots Mapping project? Is it a body of code, available under an open-source MIT license at http://github.com/jywarren/cartagen? Is it a set of mapping practices, or tools, which have been employed in Lima, Peru, or Rio de Janiero? Or is it a community of practitioners and the web site, wiki, and mailing list which tie them together?

Fundamentally this project attempts to make mapping easier for lay users, in order to broaden participation in cartography. Throughout much of the world, maps can be seen as a tool of the state and of industry to express control over world we live in. By simplifying the means to create maps, from the data gathering through the editing and publication of digital and print maps, the tools and techiques I have created are designed to further democratize cartography. In turn, it is hoped that the ability of a wider public to make maps at a reasonable cost will empower bottom-up cartographic activism and circumvent the current power structure of mapmaking.

The core of the Grassroots Mapping project is the *application* of a novel combination of technologies to specific communities. These technologies consist of low-cost aerial imaging techniques using balloons and kites, and a novel online tool for stitching the resulting imagery into maps. The success of these tools is due to the effort and faith of the organizations and individuals who were willing to adopt these new and unfamiliar tools, and who saw their potential for use in their communities in Lima, Peru, and the oil spill crisis on the coast of the Gulf of Mexico. This includes Carla del Carpio of Manzanita 'A' and Ernesto Fernandez of Centro de Información y Educación para la Prevencinó del Abuso de Drogas (CEDRO), both in Lima, Peru, and Daniel Miracle and others from Escuelab, also in Lima. It includes Kris Ansin, Shannon Dosemagen, and Anne Rolfes of the Louisiana Bucket Brigade in New Orleans. It also includes the dozens of participants who tirelessly flew kites and balloons, and untangled and wound miles of string day after day. Perhaps most importantly, the tools grew and evolved in response to sustained use by participants, and with the input and collaboration of those who used them.

1.1.1 Uses of aerial imagery

Participants in the project have made maps for diverse purposes, including environmental monitoring, tenure rights, journalism, and commercial use. Many maps were created in youth workshops emphasizing hands-on learning and community planning, and the tools' unique ability to produce on-demand maps was explored in crisis situations and areas of conflict. Due to their low cost, the techniques have potential for even broader use in asset mapping in low-income or developing areas, and local-level urban planning. The ability to see one's home from a new perspective can initiate thought and discussion about community, environment, and social issues. By engaging with and teaching local communities to use the tools, mapping has taken on more personal relevance than efforts which charactarize themselves as remote sensing — efforts which treat people as data and gloss over the human side of cartography.

1.1.2 Grassroots Mapping as pedagogy

To facilitate widespread adoption, the project evolved to include a variety of teaching materials, printed guides, online videos, and workshops, both by myself and by the diverse collaborators who took ownership of the tools. These materials addressed a broad range of audiences, from 10-15 year olds in Lima, Peru to environmental activists in West Virginia and Kentucky. This documentation evolved as I collaborated with and instructed participants in dozens of workshops over the past year, and include a project wiki, a blog on which participants document their work, videos, and a mailing list where new ideas and projects are discussed and critiqued.

1.1.3 Grassroots Mapping as a community

Ultimately, even the digital tools, including the Cartagen map rendering framework and the Cartagen Knitter, a tool for orthorectifying aerial imagery, were built with assistance and support of colleagues and contributors in the broader mapping community. That this has become the norm in technology projects does not detract from the fact that much of this work would have been impossible without such contributions, and that one of the greatest strengths of this project has been its development in collaboration with communities which have specific needs.

Building tools is unlike developing more abstract technologies in that to be successful, a series of compromises and pragmatic decisions must guide the design process, as well as continuous communication with an audience of users. The Grassroots Mapping project has evolved in response to these needs and should be exam-

Figure 1.1: Student participants in a Grassroots Mapping workshop in Samtredia, Georgia

Table 1.1: Grassroots Mapping workflow

Capture	Orthorectification	Publication
2-3 people can map several square km in 1 day	Sorting photos can take >1 hour, stitching up to 1 day	Export from Cartagen Knitter generates a TMS or printable GeoTiff; only web access is needed.

ined in the context of the specific uses it has attempted to address, rather as an isolated or purely academic work.

1.2   Tools, technologies, and audience

The tools developed as part of the Grassroots Mapping project address the needs of both committed enthusiasts who need powerful and efficient mapping technology, as well as those who have little experience and expertise but need simple and direct tools to make maps. Therefore, some of the tools, while being simple to use, are intended for 'power users' or those technically fluent in writing and editing code. The Cartagen framework falls under this category. Other tools, such as the balloon and kite platforms for capturing aerial imagery, are intended for a wider audience, as is the Cartagen Knitter, a specific application of the Cartagen framework. A description of the various tools follows.

The Grassroots Mapping Kit can be used to capture original aerial imagery, process and stitch the results, and publish digital and print maps. This section focuses on the framing, intent, and audience of the necessary tools. A technical discussion of the tools can be found in Chapter 6.

Briefly, map-makers visit the site they intend to map, bringing with them a kite, a balloon, a helium tank, a digital camera, and a minimum of 200 meters of string, along with an assortment of other materials. Attaching the camera to the tethered balloon or kite, they capture imagery by setting up the camera to automatically take pictures on a 1-10 second cycle and raising it to between 200 and 2000 meters in altitude, in accordance with local regulations. The map-makers reel in the tether to recover the camera and, using a web-enabled computer, upload the best imagery to the Cartagen Knitter web site.[1] There they create a new online map, and using either OpenStreetMap vector data or a tiled map base layer for reference, each imagery can be orthorectified and ultimately composited into a map. The results can be embedded in another website for online viewing, exported as a Tiled Map Service (TMS) service, or printed from a Geographic TIFF (GeoTIFF), depending on the intended use.

The Grassroots Mapping Kit and associated techniques are thoroughly documented at the project wiki, at http://wiki.grassrootsmapping.org, and additional support and discussion is available at the project mailing list and blog, which can be found at http://grassrootsmapping.org along with extensive documentation of past and in-progress mapping efforts around the world. Printed documentation is also available in the form of available in the form of a 5-page illustrated guide

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[1]http://cartagen.org/maps/

and several checklists designed to accompany each kit.[2]