Mapping for Change: The emergence of a new Participatory GIS practice

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Background

The *Mapping for Change International Conference on Participatory Spatial Information Management and Communication* was held at the Kenya College of Communication of Technology, in Nairobi, Kenya, 7-10 Sept 2005. The conference brought together 154 people from 45 different countries and nations with practical experience in using and facilitating Participatory Spatial Information Management and Communication (PSIMC) tools and processes - ranging from non-digital participatory sketch mapping to digital Participatory GIS (PGIS).

What unites these practitioners is their belief that PSIMC practice can have profound implications for marginalized groups in society: it can enhance capacity in generating, managing and communicating spatial information; it can stimulate innovation; and ultimately, it can encourage positive social change. The tools generated and used in this practice can become interactive vehicles for networking, discussion, information exchange, analysis and decision making.

When PSMIC practice first began to move from the non-digital to the digital realm in the mid 1990's, concerns arose over the feasibility of applying relatively complex PGIS tools in a participatory manner. In their paper titled "Participatory GIS: opportunity or oxymoron?" Abbot *et al* (1998) identified and debated the "benefits and problems of a participatory GIS approach." They asked whether GIS can be used by local people, "empowering them to influence policy decisions through owning and using the data" or whether "a 'participatory GIS' would simply be extractive"?

Though these fundamental questions still exist, particularly for digital tools such as PGIS, practitioners have now had eight years to develop and apply these tools, as well as to continue their exploration of older, non-digital PSIMC tools. The *Mapping for Change* conference has allowed practitioners to share their experiences, both successes and failures, and identify lessons learnt over this period. The contents of this special issue mark how PSIMC practice has matured and how it has begun to develop a set of ethics and an effective methodology that are based on first-hand experience. These ethical considerations will help to guide both new and experienced practitioners alike to ensure that local communities can develop and communicate their own data and ultimately influence larger decision-making processes.

Box 1. Tools and methods used in Participatory Spatial Information Management and Communication (PSIMC)

A broad range of tools and methods are available to practitioners and community representatives. These range from low-tech sketch mapping to hi-tech PGIS. As these tools increase in complexity, their use often (but not always) involves the incorporation of many of the preceding tools, resulting in approaches where multiple tools are used.

Ephemeral mapping: This most basic method involves drawing maps on the ground. Informants use raw materials like soil, pebbles, sticks and leaves to represent the physical and cultural landscape.

Sketch mapping is a slightly more elaborate method where a map is drawn from observation or memory. It does not rely on exact measurements, including the use of a consistent scale and geo-referencing. It usually involves drawing symbols on large pieces of paper to represent features in the landscape.

Scale mapping is a more sophisticated map-making method aimed at generating geo-referenced data. This allows community members to develop relatively accurate scaled and geo-referenced maps which can be directly compared with the maps of adversarial parties.

3D Modelling integrates spatial knowledge with elevation data in order to produce stand-alone, scaled and geo-referenced relief models. Geographic features relating to land use and cover are depicted on the model by the use of pushpins (points), yarns (lines) and paints (polygons). On completion, a scaled and geo-referenced grid is applied to facilitate data extraction or importation. Data depicted on the model can be extracted, digitised and plotted (Rambaldi and Callosa-Tarr, 2002a).

Photomaps are printouts of geometrically corrected and geo-referenced aerial photographs (orthophotographs). Orthophoto-maps are a source of accurate remotely sensed data that may be used for large scale community mapping projects. Community members can delineate land use and other significant features on transparencies that have been overlaid on the photomap. Information on the transparencies can be scanned or digitized and geo-referenced later. Remote sensing images at a suitable scale are an increasingly appropriate alternative, when they can be easily and freely (or very cheaply) downloaded from the Web. (Muller et al., 2003).

Global Positioning Systems (GPS), have become more affordable, and their use has spread rapidly among NGOs and community organizations. GPS is a satellite-based positioning system that can tell you your exact location on the earth using a known co-ordinate system such as latitude and longitude. The technology is often used for the demarcation of areas of land where access to and control over natural resources are in dispute. Data recorded are frequently used to add accuracy to information depicted on sketch maps, scale maps, 3D models and other less technology-rich community mapping methods.

Map-linked multi-media information systems are similar to GIS technologies but simpler to understand and manage. Local knowledge is documented by community members using digital video, digital photos and written text, stored on computers and managed and communicated through the interface of an interactive map. By clicking on features of the interactive map the other multimedia information can be accessed.

GIS is a computer-based system designed to collect, store, manage and analyze spatially referenced information and associated attribute data. GIS technology is increasingly being used to explore community-driven questions. In the process, local spatially referenced, as well as non-spatial, data are integrated and analyzed to support discussion and decision making processes. 'Mobile GIS' has become much better adapted to participatory and local community use since the development of GIS software designed to work with hand-held computers or ruggedised laptop computers under field conditions.

Adapted from Giacomo Rambaldi, Peter A. Kwaku Kyem, Peter Mbile, Mike McCall and Daniel Weiner (2006); and Jon Corbett (2005)

Description of the conference

The Mapping for Change conference took place over an intense three days. It included 12 plenary presentations followed by discussions, and 32 presentations delivered during parallel sessions. These in turn were followed by working group discussions based on assigned tasks and questions. Results of the working group discussions were presented in plenary and further debated.

The initial objectives of the conference organisers[1] were:

- to share and build on experiences gained in developing countries and Canadian First Nations[2] in order to develop guidelines on good PSIMC practice, and
- to set the foundation for the establishment of regional networks and resource centres in order to promote and support good practice in PGIS.

Box 2. Good Practice

Good practice is centred on careful, user-driven/user-centred, ethically conscious PSIMC practice. The "participatory" aspect means that the community take as high as possible a degree of control over decision-making processes, managerial power and responsibility during all the different stages involved.

These intended objectives were fully realized. From Kenya to Canada, Indigenous and First Nations participants, representative organizations and researchers alike all shared their experiences of PGIS initiatives. Working groups responding to specific tasks brought participants together to engage in collaborative learning on issues including:

- Enabling and disabling environments for PSIMC, focusing on policies and funding that support or weaken the chances for good practice.
- Sharing experiences relating to PSIMC practice, including ways of representing local spatial knowledge, claiming land and managing resources, issues related to participatory process, and ideas on how to support the preservation of cultural heritage.

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[1] The conference was organized by Technical Centre for Agricultural and Rural Cooperation (CTA) ACP-EU, International Institute for Geo-Information Science and Earth Observation (ITC), Environmental Research, Mapping and Information Systems in Africa (Ermis Africa), International Institute of Rural Reconstruction, Africa Regional Center (IIRR-Africa), Lands and People Information Sharing Society (LAPIS), GIS for Developing Countries (GISDECO) Network, West Virginia University Office of International Programs and Department of Geology and Geography.

[2] The term First Nations is used specifically to refer to the indigenous peoples of the land that is now called Canada.

- Building solidarity and a common vision among PSIMC practitioners, including the development of a way forward for enhancing networking and communication, drafting regional strategies for supporting PSIMC practice and identifying key terminology for donors and international development agencies in order to encourage funding for the promotion of PSIMC practice.

Guidelines for good PSIMC practice under different socio-political contexts in developing countries are discussed on www.ppgis.net. Giacomo Rambaldi, Mike McCall, Robert Chambers and Jeff Fox sum up these views in their article in this special issue.

A number of important themes relating to good practice emerged from conference presentations, posters, workshops and discussions. These can be summarized as the need to consider PGIS as a *practice* going beyond participatory mapmaking and involving additional dimensions of networking and communication and building on the "three Ts" - transparency, time, and trust - the first two being conditions for the last. Trust was a key term used throughout the conference; with maps being so very powerful, - the visual shock of maps holding such potential for good or bad influence, trust between outsider facilitators and local people becomes a critical condition for success.

Box 3. The three Ts

Transparency
Transparency refers to the type of communication necessary for good PSIMC practice. It implies clarity, accountability and the use of transparent procedures such as open meetings. It respects the need for communities engaging in the process to be informed of all the potential drawbacks that might be associated with the application of the tools. Thus, any requests made of the technical advisors for clarification should be answered in a straightforward and honest way, using language that is understandable.

Time
Time is needed to maximize the positive impacts derived from PSIMC projects and to enable local communities to take ownership over the tools. There needs to be a clear recognition of the need for a substantial investment of time. Tight time frames, imposed to meet outsider agendas, often serve to undermine a project. They might also disempower communities by preventing them from fully understanding the technologies or fully exploring the potential benefits from their application and use.

Trust
Trust refers to the relationship between the different groups and individuals. It is a critical ingredient for undertaking PSIMC practice. Barbara Misztal writes that trust makes life *predictable*, it creates a *sense of community*, and it *makes it easier for people to work together*. The need for trust appears to exert a discipline on practitioners. Without the appropriate behaviour and attitudes for developing this trust, PSIMC practice is difficult indeed.

Transparency and **Time** being prerequisites for establishing **Trust**.

Description of this special issue

The articles in this special issue of PLA are drawn from papers and posters presented at the Mapping for Change conference and focus on case studies and experiences from the developing world and Canadian First Nations. They represent the broad application of a number of approaches and tools in various socio-economic and geographic settings by practitioners sharing a considerable depth of experience. It is hoped also that these papers communicate a flavour of the enthusiasm and innovation generated during the conference.

This special issue is particularly timely as it also highlights and documents a significant coming-of-age in PSIMC practice. It presents examples of the use and application of both old as well as cutting-edge tools applied in new contexts as well as in innovative and fun ways. It also represents a metamorphosis from a scattering of disparate and unconnected projects, organizations and individuals that use these tools, to the creation of a networked and united community of practitioners.

Structure of the special issue

The articles in this special issue are divided into three broad groups:
- those that focus on providing a case study relating to the application of a specific PSMIC tool in a grassroots setting,
- those that focus on the application of multiple tools to address specific issues being faced by a community, and
- those that are more theoretical, and associated with issues including ethical considerations, potential pitfalls and other lessons learnt from experiences gained through long term application of PSMIC tools.

Tool based case studies

As the practices associated with PSMIC innovate and evolve, it is interesting to see examples of how specific tools are being modified and employed to address the issues faced by local communities - and to understand whether they are being useful and/or successful in achieving their objectives.

Jon Corbett and Peter Keller introduce a participatory map-based multimedia information system, which became known in the communities as a Community Information System (CIS). In their approach, traditional knowledge is documented by community members using digital video, audio-recording, digital photos and written text, stored on computers and managed and communicated through the interface of an interactive map. The authors showcase the CIS using a case study from Indonesia.

Giacomo Rambaldi, Silika Tuivanuavou, Penina Namata, Paulo Vanualailai, Sukulu Rupeni, and Etika Rupeni compare the use of participatory 3D modelling (P3DM) and participatory orthophoto mapping in Fiji and explain how Participatory 3D Modelling (P3DM) was effective in supporting collaborative resource planning and the documentation of cultural heritage. P3DM integrates spatial information and people's knowledge to produce stand-alone scale relief models. As the paper demonstrates

P3DM has proved to be user-friendly medium for generating, analysing and communicating local knowledge.

Peter Kyem explores the role of PGIS in mediation and how the technology can be used to promote consensus building. Using the example of Kofiase in Southern Ghana, he identifies how PGIS applications helped conflicting stakeholders find a pathway to compromise and overcome their disagreements.

Issue based case studies

PSMIC practice often evolves to address specific issues being faced by a community. This means that multiple tools might be used in a series of attempts to ameliorate those issues.

Craig Candler, Rachel Olson, Steven DeRoy, and Kieran Broderick document the history of PGIS practice in the Treaty 8 area of British Columbia, Canada. The authors describe the range of different practices from community mapping through to PGIS development and application, and methodologies used. The authors identify the Treaty 8 area as a critical site for learning about sustained, as well as sustainable, practice.

Tsion Lemma, Richard Sliuzas and Monika Kuffer present an example from Addis Ababa, Ethiopia, where PGIS practice was used in multi-stakeholder decision-making relating to improving slum monitoring mechanisms. Their approach incorporates locally relevant and spatially detailed information gathered through focus group discussions, field observation with community members, and visual image interpretation using satellite images and aerial photographs.

Sylvia Jardinet's paper tells us about Communitarian Cartography, presenting an example of a use for PGIS and GPS that is oriented towards the prevention and resolution of conflicts related to land and natural resource access and use. The cooperative of Gaspar Garcia Laviana in Telpaneca, Nicaragua, has produced a geo-referenced map of their community. A public file of their properties is available and can be consulted by any member of the cooperative.

Pascale de Robert shares her experience related to supporting the Kayapo Peoples in Brazil in making maps of their traditional land use management areas. These maps are made from satellite imagery and ground truthed using GPS. She describes how the Kayapo took the process into their own hands and redirected it towards producing and using maps as political tools to highlight the territorial and social unity that the Kayapo wish to emphasize.

Simon Mayes, Carol Murphy, Elvis Mwilima, Nathaniel Nuulimba, Sandra Slater-Jones and Julie Taylor share their experiences, including the opportunities and threats, of mapping the San territories in the Caprivi Region of Namibia. They note the potential of PGIS practice to expose and address the complex and politicized issues of identity, rights and land. They further identify how these maps can have multiple applications, including the strengthening of local rights and capacity to manage an environmentally important conservation area.

Peter Minang and Mike McCall examine how PGIS facilitates the use of local / indigenous knowledge in community forestry planning for carbon sequestration. Accessing payments for environmental services such as carbon mitigation requires extensive and expensive technical information for baselines and monitoring which local communities often lack. Community spatial knowledge can be a vital source of information, but the local knowledge representations need to be translated into a scientific knowledge format appropriate for accessing Kyoto Protocol and other carbon funds. The authors explore the extent to which PGIS can enhance the use of local and indigenous knowledge in the carbon certification processes.

Theory and reflections from practice

It is too easy when sharing experiences relating to ==PSMIC== practice to focus on success stories, and for practitioners to be hesitant in engaging in critical reflection relating to their own work. This final grouping of papers addresses some important but little discussed issues relating to perennial problems with the practice; issues such as potential pitfalls that projects might face, the concerns surrounding precision, and the ethics of the practice.

Mac Chapin shares a wealth of practical experience relating to problems that often arise in community mapping projects and how to avoid them. In particular he cautions the reader to invest time in the planning of projects, and notes the important role of project leaders in guiding the work to a successful outcome.

Peter Poole describes two strategies for organizing tenure mapping projects, namely partial participation, where the community learns to gather traditional knowledge using interviews and sketch mapping, but where all computerised aspects of map-making are outsourced, versus complete participation, where community members are trained in all aspects of map making. He illustrates his article using a number of case studies from around the world, before going on to raise important questions over the sustainability of such projects.

Jefferson Fox, Krisnawati Suryanata, Peter Hershock and Albertus Hadi Pramono raise a number of important ethical issues related to the adoption of PGIS technologies in Asia. Despite a number of successes they note that the adoption of these tools does not always have a positive desired effect. The authors lay out a number of potential pitfalls and urge practitioners to develop critical clarity with respect to mapping, based on a comprehensive understanding of both intended and likely unintended consequences of certain actions.

Mike McCall raises important questions about the issues of certainty and precision within the practice of PGIS. The terms have become of great significance in the realm of more technical GIS application, yet Mike asks whether it is misleading to misrepresent fuzzy, ambiguous reality as precise or accurate, especially when PGIS represent data acquired using participatory methodologies, that represent local interpretations of certainty, reliability, and relevance.

Although no papers at the conference specifically addressed ethics in ==PSMIC== practice, ethics emerged as one of the main cross-cutting concerns of the participants throughout the conference. Issues raised included the costs of wasting people's time, of raising expectations that are not met, of endangering people through the information they show,

of the practice being used to extract information and/or put it in the public domain which outsiders would then exploit, as well as of the practice actually creating conflicts and demanding precision where fuzziness might be more appropriate. Participants recognised the need to formulate commonly recognized practical ethics that would help guide the community of practitioners. Giacomo Rambaldi, Robert Chambers, Mike McCall and Jeff Fox's paper attempts to compile a number of the ethical issues raised during the conference and further discussion among practitioners and researchers via different channels.

Conclusion

This special issue helps to build recognition of a growing community of PSMIC practice in developing countries. It also contains a wealth of practical, hands-on advice from some of the most experienced members of this maturing discipline . This issue not only presents success stories, it also raises issues of where and why projects might fail, and provides advice on how to avoid these potential pitfalls. It provides sage advice on the need to focus on developing trust; both by giving the process the time that it requires to build this trust, as well as by paying attention to the importance of transparency in all interaction.

We feel that this special issue should be of great use to practitioners, including local and Indigenous communities, as well as other organizations and individuals wanting to undertake a PSMIC project. It is also relevant to students and researchers working in academic fields associated with PSMIC practice.

The Mapping for Change conference was a wonderful opportunity to bring people together to share experiences and ideas, as well as to solidify and encourage a wider international network of communities, practitioners and researchers alike. The Guest Editors of this special issue hope that the Mapping for Change conference, as well as this compilation of articles that have resulted from the conference, will also help to bring recognition to our growing community of practice.