Applications of Participatory Mapping and PGIS using Indigenous and Local Spatial Knowledge

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Some Origins

The range of applications of PGIS has developed extensively since the early examples mainly form North America. In the 1980s (and some from earlier) urban local neighbourhood groups and indigenous communities of Native American and First Nations began the early steps of marrying GIS technical activities to PRA participatory approaches. The primary and most frequent interest was for making, verifying and consolidating claims for land and natural resources in the indigenous communities, (see e.g. Aboriginal Mapping Network (AMN) at www.nativemaps.org), and for neighbourhood amenity and environmental planning in urban communities.

In the 1990s and later, the benefits and advantages of applying PGIS methods were extended to many other applications. In a seminal review of local-level mapping and geomatics of local spatial knowledge, Peter Poole (1995) categorized six types of applications, of which he interprets the first five as inexorably progressing from one to the next in a development process.

- To gain recognition of land rights
- To demarcate traditional territories
- To protect demarcated lands
- To gather and guard traditional knowledge
- To manage traditional lands & resources
- To mobilize community awareness & resolving conflicts.

Poole's categorisation is still appropriate in the essentials, and the categories used here build on and modify this innovative analysis.

An extensive annotated bibliography of PGIS applications worldwide (McCall 2009) is found in the CD-ROM and in the IAPAD website at
http://tinyurl.com/yjywfon

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I. Claiming 'Our Land'

This incorporates several different components:

- Demarcate traditional boundaries; for land and other natural resource claims
- Legal recognition of customary land rights

- Identify areas of use and occupancy
- Priorities for claims, between different communities
- Evaluation of communities' scenarios of alternative land management systems
- Preparation for court procedures – rigour, accuracy, and appearance of the spatial information.

II. 'Knowing and Using Resources means Mapping Resources'

These applications are at several levels of intensity and complexity.

The first is to identify, locate, analyse specific natural resources

- Forest and woodland resources
- Trees, vegetation & non-timber forest products (NTFP) – outside the forest
- Environmental services – including carbon
- Water resources and management, such as traditional irrigation
- Pastoralism and livestock management
- Soils and especially traditional knowledge of soils. ethnopedology
- Land suitability, and land evaluation
- Wildlife management and hunting, terrestrial areas
- Fisheries - marine bio-resources & Inland
- Mining and minerals extraction
- Wetland farming systems.

Secondly, more complex is the management of traditionally-held natural resources *systems* (NRM) and traditionally-held lands and areas.

There are three levels of NRM to be considered:

i) Exploitative use of a resource or of an eco-unit

ii) Maintenance or reproduction of a particular resource or unit

iii) Management of the broader ecosystem containing and nurturing the resource, e.g. *Bioregional Map; Traditional Use Studies (TUS); l*ocal knowledge of hazards; *Land Literacy.*

PGIS in NRM includes:

- Land use and land cover; landscape units; land use management, including watershed management; (integrated) farming systems
- Coastal zones
- Conservation management; *Traditional Use Studies*
- *Bioregional mapping*; ecosystem planning
- Hazards and risky landscapes
- Working with external management plans
- Tourism and eco-tourism.

III. Participatory Environmental Impact Appraisal

Applications in:
- EIA (environmental impact assessment); environmental sustainability
- Environmentally fragile areas
- Environmental risk assessment
- Environmental justice (equity).

IV. Local Knowledge of Hazard Management and Disaster Risk Assessment

Community mapping and PGIS activities in:

- Frequent, short return-time hazards, both 'natural' and 'human-induced' hazards, and
- Long-return time, infrequent, hazards
- Environmental hazard areas, e.g. landslides, volcanic activities, pests, malaria, flood risk assessment – damage, vulnerability, coping, land mine hazards, urban fires, safety, security, environmental health hazards, etc.
- Preparation, and warning signals, etc.
- Mapping vulnerability assessment (VA)
- Mapping coping strategies, resilience, and adaptation
- Post-disaster mitigation mapping
- Mapping people's perceptions and priorities
- Spatial planning for unwanted land uses or structures:- NIMBY ('not in my backyard'); community involvement in siting LULUs (locally unacceptable land uses)
- Siting of hazardous materials and structures; siting of warning systems, relief centres, shelters, escape routes, etc.

- Urban social hazards – crime, drugs, accidents
- Slow onset hazards and disasters; climate change; sea level rise; long-term adaptation.

V. Managing Conflicts – Internal & External

Community mapping and PGIS and Participatory 3D modelling to:

- Identify, understand, predict better, and ameliorate conflicts and competition
- Mediate and negotiate
- Post-conflict.

However, it is also feasible that the mapping and recording of claims and counter-claims can also lead to the exacerbation of land and resource conflicts.

VI. Mapping Equity

The following quotes give the conceptual basis behind the special efforts made in PGIS to map equity and spatial justice: "maps are never value-free images, both in the selectivity of their content and in their signs and styles of representation, maps are a way of conceiving, articulating and structuring the human world which is biased towards, promoted by, and exerts influence upon particular sets of social relations." (Harley 1988) "GIS displays relationships much less easily than attributes … how dangerous is the invisibility of power relations" (Dunn et al. 1997)

There are several angles to this:

- Environmental equity
- Environmental spatial justice

- Socio-economic equity; mapping gender factors.

VII. Strengthening the Community

- Expanding the community awareness of their rights and entitlements to their lands and landscapes
- Institutional strengthening of the community's institutions and organisations
- Empowerment of the community as a whole, or empowerment of certain groups and sections within the community (e.g. women, pastoralists, landless, elders, children, property owners, lower castes, nomads)
- Cultural-historical knowledge, such as cultural landscapes. (see below)

VIII. Cultural Historical Knowledge, Local History

Cultural knowledge includes the sacred values of land and space for local, and especially for indigenous, peoples.
- Cultural landscapes
- Places of historic, cultural and religious significance
- 'Land for the Ancestors' - ancestral burial grounds, memorials, e.g. battle sites or ancient settlements, and other culturally significant sites and areas
- Sacred lands
- Indigenous names; toponyms, cosmovisions, creation and origin myths, etc.

References

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